Universe Evolution
Under the Claim for Minimum Contradictions

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The purpose of this paper is to approach the Universe Evolution on the basis of the claim for minimum contradictions. This implies that the evolution is based on the interaction of the gravitational (g) with the electromagnetic (em) space-time-matter field and not on any other entities e.g. dark matter etc. Thus, new working devices related to energy production and phenomena unexplained according to what until now has been accepted as valid, can be explained. Through this interaction particles can acquire mass without the need of Higgs' boson.

1. Introduction

Since minimum contradictions theory is not well-known, an effort is made in this paper to show the basic line supporting what is claimed as valid.

More specifically the following are mentioned:

1. The Claim for Minimum Contradictions and the theorem from which this claim originates.
2. An introduction to Minimum Contradictions Physics related to the nature of what is regarded as reality through the minimum contradictions equations.
3. The communication of the gravitational (g) space-time with the electromagnetic (em) one. This communication constitutes a key point for a better understanding of this paper.
4. The energy conservation of a closed matter space-time system where it is shown that a charge can participate in the energy balance. The basic conclusions of this, is the following:

   Empirical Statement I: "During the approach of an electron with a proton there is absorption of gravitational energy".

   Empirical Statement II : An electromagnetic field, within a matter system, creates a gravitational field whose the acting force equals the electromagnetic force on the system and vice-versa.

   where as Empirical Statement is defined a statement compatible to the theory proposed having a possibility to be verified through an experimental way.

On this basis the Universe Evolution is described through the interaction of the gravitational (g) with the electromagnetic (em) space-time-matter field and not through any other entities e.g. dark matter etc. This is compatible to new working devices and phenomena unexplained according to what until now has been accepted as valid. Through the interaction mentioned, particles can acquire mass without the need of Higgs boson.

2. The Claim for Minimum Contradictions

2.1. General

Every Physics Theory beyond its particular principles is stated based on the language basic communication system. This system obeys the Aristotle logic (Classical Logic), the Leibniz' Sufficient Reason Principle -according to which, for everything we seek the reason of its power- and a hidden axiom which states that "there is anterior-posterior everywhere in communication". In fact, the way in which we communicate is not a simultaneous process but it is characterized by the existence of anterior and posterior; one word is put after another, one phrase after another e.t.c.

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.

If we call by Λ a logic consisting of the Classical Logic and the Sufficient Reason Principle, the following can be proved [1]:

Theorem I: " Any system that includes logic Λ and a statement that is not theorem of logic Λ leads to contradiction."

Statement I: " Any system that includes logic Λ and the anterior-posterior axiom leads to contradiction."

where the anterior – posterior axiom is stated as follows.

Anterior – Posterior Axiom: "There is Anterior-Posterior Everywhere in Communication"

When we try to describe reality through a theory we cannot do it simultaneously but in anterior-posterior terms. Even anterior-posterior, in physical reality, itself is not known but only when it is described. Therefore, this axiom includes every anterior-posterior described; not only the indicating the order of communication elements (words, phrases, e.t.c.). It is noted that in the early papers, which this work is based on, the term earlier posterior was used. However this term applies better to time and not to any countable magnitude. Dr. C.K.Whitney proposed the term anterior-posterior which is more neutral and therefore it can apply beyond time [1,2].

Despite of all these, when we communicate in a way that we consider logical, we could say that we try to understand things through minimum possible contradictions since contradictions are never vanished. On this basis we can state [3]:

The Claim for Minimum Contradictions: " What includes the minimum possible contradictions is accepted as valid".

According to this claim we obtain a logical and an illogical dimension. In fact, through this claim we try to approach logic (minimum possible contradictions) but at the same time we expect something illogical since the contradictions cannot be vanished. However, the question is raised of whether this claim has any sense since one contradiction implies infinite contradictions . The answer to this is that the claim for minimum contradictions creates a modification of the basic communication system since it implies a logic "attractor" through minimum possible contradictions required [1].

3. Minimum Contradictions in Physics

3.1. General

Every theory includes at least the principles of the basic communication system. According to theorem I, further axioms beyond the ones of basic communication must be avoided since they can cause further contradictions. Thus the Claim for Minimum Contradictions operates as a Simplicity Principle. This is compatible with Ockham's razor [1]; however Ockham's razor does not imply any contradiction.

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 can state:

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 is valid, a unifying principle is required, since everything, *i.e.* matter, field, and space-time, needs to be described in anterior-posterior terms.

At first sight, for a minimum contradictions physics we can make the following statement:

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

It is noted that time implies the existence of anterior and posterior; space does, too. If I say 10cm, I mean the existence of anterior-posterior measuring states corresponding to 1,2,3….,10 cm. Therefore, the existence of anterior and posterior is the condition for space and time to exist and *vice-versa*. Thus, because of Statement II, for a least contradictory physics we can state the following statement:

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

Since everywhere there is space-time and not something else, *Space-Time-Everything* can be regarded as *Matter-Ether*. A matter system, in general, has differences within its various areas. This means that a matter system, in general, is characterized 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 can be expected to be deformed due to different rates of anterior-posterior. This means that time can be regarded as a 4th dimension which implies Lorentz' transformations and in extension a relativistic theory.

On this basis space-time can be regarded either *as geometry or as deformable matter- ether*; *this is compatible both with Einstein's and Poincaré's point of view.*

Basic tool of this work is the Hypothetical Measuring Field (HMF); this is a term initially proposed as "image Field" which has been changed in order to correspond exactly to what it signifies after a proposal by P.F.Parshin [4]. According to M.C.Duffy this term is compatible to an approach taken by Eddington and to recent studies on the physical vacuum based on information science in which material particles, which have a wave particle nature interact with an "image-taking field" [5].

As Hypothetical Measuring Field (HMF) is defined a hypothetical field, which consists of a Euclidean reference space-time, in which at each point A_0 the real characteristics of the corresponding, through the transformations of deformity, point A of the real field exist.

In the HMF, *we define as relative space time magnitude sr the ratio of the real infinitesimal space time magnitude* ds *to the corresponding, through the deformity transformations, infinitesimal magnitude* ds_0 *of the reference space- time* i.e. $sr = ds / ds_0$

This can apply to *relative time* $tr = dt / dt_0$, to *relative length in a direction* $\boldsymbol{n}$ $lr_n = dl_n / dl_{n0}$ and to *relative volume* $vr = dv / dv_0$.

In a space-time description we don't know a priori what energy is; we define energy *dE* of an infinitesimal space-time element its 'ability to exist'. We may notice that an infinitesimal space-time element with energy *dE* exists on condition that some corresponding 'anterior-posterior' exist too. With respect to the HMF a space-time element is observed during a time

dt that is different from the time dt_0 of the corresponding reference space-time element. 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; this ability, by definition is energy; when $dt = dt_0$, this ability is dE_0. Thus, we can write [1]:

$$dE \sim dt \quad \text{and} \quad dE/dE_0 = dt/dt_0$$

(1)

which is a relativistic relation expressing the Energy-Time equivalence.
Eq. (1) can be viewed in two ways:
a) When dt_0 is a unit of time, Eq. (1) 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 Eq. (1) can be written in the form:

$$dE/dE_0 = dt/dt_0 = (f/v)/(f/v_0) = v_0/v \quad (2)$$

where v is the frequency of a periodic phenomenon of comparison and f an arbitrarily constant factor through which we can change the scale of v, v_0. If $v = 1$, v_0 must be different in various points $(\mathbf{r}, t)$ of the HMF. If this is the case Eq. (2) can be written in the form:

$$dE/dE_0 = v_0(\mathbf{r}, t)$$

(3)

Thus, for the same equation we have the following versions:

$$dE/dE_0 = dt/dt_0 \quad \text{observation} \quad \text{(relativity theory)}$$

(4)

$$dE/dE_0 = v_0(\mathbf{r}, t) \quad \text{action} \quad \text{(quantum mechanics)}$$

(5)

On this basis, we can reach the basic De Broglie's principle for energy, for $E_0 = h$ (arithmetically) *i.e.* [1]:

$$E = hv \quad (6)$$

At second sight, because of the claim of the minimum contradictions, we conclude that *Matter-Space-Time-Everything-Aether* can have logical and contradictory behavior at the same time; *this can be valid only if space-time is stochastic.*
According to M.C.Duffy "The modern ether can be treated as a sea of information, and a generator of dynamic algebras, which is revealed as a discretum rather than a continuum on the smallest scales of space-time" [5]. This can be regarded as compatible to stochastic space-time which is not continuum on the smallest scales.
According to A.Pais, Einstein had said:
"I consider it quite possible that physics cannot be based on the field concept; i.e., on continuous structures. In that case nothing remains of my entire castle in the air, gravitation theory included, and the rest of modern physics" [6].
Despite the fact that space-time may be stochastic, there are basic relativistic relations that continue to be valid; perhaps relativity principle can be stated on the basis of space-time operators as it will be mentioned.

At first sight, QM seems to remain unchangeable. However, what it describes, according to this work, is not a particle wave but the stochastic space-time in the Hypothetical Measuring Field (HMF). As was mentioned a De Broglie's basic principle can be regarded as an other view of a basic relativistic relation of matter space-time; De Broglie's principles can be proved as valid for stochastic space-time. On this basis, we have the frame in which a unified theory can be stated while the operators of relative length in a given direction and relative time can be defined; by the aid of a Ψ wave function the geometry of stochastic space-time can be described.

With starting point R.M. Santilli's paper: " Lie –Admissible Invariant Origin of Irreversibility for Matter and Antimatter at the Classsical and Operator Levels" [7], we may notice the following:

An operator can be regarded as the basic acting law which cause all phenomena revealed. On this basis, if invariance is valid *in general* at operator level, it means that the basic laws are invariant. This might be close to a new approach of relativity principle. Space-time operators, according to this work, are invariant to Lorentz' transformations; however the final result i.e. real measurable space-time is non-relativistic, it seems to be fractal [1].

The stochastic space-time derives from the distribution of the properties of a flat relativistic space-time based on the probability density $P(\mathbf{r},t)$ of Schröndinger's relativistic equation which is proved as valid [1].

The negative values of $P(\mathbf{r},t)$ 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). However, the question is raised of whether Schröndinger's relativistic equation or Dirac's equation should be taken into account. As it is known from classical works Dirac's equation is based on the requirement for linear operators correlation. According to the spirit of this work, the linearity that is mentioned constitutes an additional restriction which is not theorem of logic Λ and therefore because of theorem I causes further contradictions beyond the ones imposed by the stochastic space-time consideration. Schröndinger's relativistic equation, without any potential term, can derive without any further assumption by the aid of Fourier analysis and corresponds to a minimum contradictions description. *It is noted that, according to this point of view, potential does not exists since stochastic space-time is matter it self and not a simple geometrical notion* [1]. It is also noted that P. Rowlands has noticed that fermions which derive from Dirac's equation do not describe a whole; "the particle and its "environment" can be considered as two "halves" of a more complete whole" [8]. Fermions have spin ½ which according to classical point of view corresponds to real particles. According to the spirit of this work we can have spin ½ due to coexisting local equivalent particle fields of gravitational (*g*) and electromagnetic (*em*) space-time even though they are described by Schröndinger's relativistic equation.

The electromagnetic (*em*) space-time is a space-time whose all magnitudes are considered imaginary and behave exactly like the gravitational (*g*). Electromagnetic (*em*) space-time is described by means of space-time wave functions such that:

$$\Psi_{em}(\mathbf{r}_{em},t_{em}) = \Psi_{em}^{g}(\mathbf{r},t) \tag{7}$$

where Eq(7) has meaning *due to the coexistence of (g) and (em) space-time under a scale* which has been found to be equal to $i\alpha$ where α is the fine structure constant.

On this basis space-time as a whole consists of:

1. real (*g*) space-time distributed according to a $P_g(\mathbf{r},t)$ function revealing so (*g*) matter or antimatter for positive or negative values of $P_g(\mathbf{r},t)$.

2. imaginary (*em*) space-time distributed according to a $P_{em}(\mathbf{r},t)$ function revealing so (*em*) matter or antimatter for imaginary positive $(+i)$ or imaginary negative $(-i)$ values of $P_{em}(\mathbf{r},t)$.

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 [9].

3.2. Minimum Contradictions Equations

The so far analysis has shown that we can express a particle field in space time terms. However, there is always a function Ψ that depends on a mass m_0. A more general description of space should be independent of any notion of mass. According to [1], for gravitational space-time, Schröndinger's relativistic equation is valid; this can be written as follows:

$$\frac{\partial^2 \Psi_g(\mathbf{r},t)}{\partial t^2} - c^2 \nabla^2 \Psi_g(\mathbf{r},t) = -(m_{0g} c / \hbar)^2 \Psi_g(\mathbf{r},t) \tag{8}$$

as was mentioned in Sect.3.1 there is not potential acting at a distance.
If we write the D'Alembert operator as: $\quad = \partial^2 / \partial t^2 - c^2 \nabla^2$
we obtain:

$$\frac{\Box \Psi_g(\mathbf{r},t)}{\Psi_g(\mathbf{r},t)} = -(m_{0g} c^2 / \hbar)^2 \tag{9}$$

$$\frac{\partial}{\partial x_j} \frac{\Box \Psi_g(\mathbf{r},t)}{\Psi_g(\mathbf{r},t)} = 0 \qquad (j = 1,2,3,4) \tag{10}$$

We notice that Eq(10) is independent of mass m_0. For the same reasons for an (*em*) space-time particle field, we can write [2]:

$$\frac{\Box \Psi_{em}^g(\mathbf{r},t)}{\Psi_{em}^g(\mathbf{r},t)} = -(m_{0em} c^2 / ia\hbar)^2 \tag{11}$$

$$\frac{\partial}{\partial x_j} \frac{\Box \Psi_{em}^g(\mathbf{r},t)}{\Psi_{em}^g(\mathbf{r},t)} = 0 \qquad (j = 1,2,3,4) \tag{12}$$

According to the Claim for Minimum Contradictions 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-space-time field locally behaves as a space-time-particle field and obeys Eqs(10,12).

Eqs(10,12) express basic law where matter-space-time obeys. These equations imply a statistical interpretation and a distribution of matter space-time according to probability density:

$$P(\mathbf{r},t) = (i\hbar / 2m_0 c^2)\left(\Psi^* \partial_t \Psi - \Psi \partial_t \Psi^*\right) \tag{13}$$

Eq(13) is valid only on condition that the space-time particle field described is extended to the infinity [1].

In this case, Ψ function locally is described by an equivalent local space-time particle field wave function Ψi, where this field is regarded as extended to the infinity. This can occur when Ψ is derivable everywhere but its derivatives are not continuous, which means that Eqs(9,11,13) have constant values of m_{0g} or m_{0em} only in the vicinity of various $(\mathbf{r},t)$.

A basic property of stochastic space-time is described by the equation [1] :

$$\overline{sr}(\mathbf{r},t) = \langle \overline{sr} \rangle_i V_0 P_i(\mathbf{r},t) = \langle \overline{sr} \rangle V_{0T} P(\mathbf{r},t) \tag{14}$$

where $\overline{sr}(\mathbf{r},t)$ is the mean value of any space-time relative magnitude and where $V_0, \langle \overline{sr} \rangle_i, P_i(\mathbf{r},t)$ refer to local particle fields while $V_{0T}, \langle \overline{sr} \rangle, P(\mathbf{r},t)$ refer to the whole matter system.

Notice:
In the reality the equivalent local particle field is not extended everywhere unless the whole constitutes a particle field. The part of this particle field which exists in reality is an infinitesimal area around the point $(\mathbf{r},t)$; this area behaves as if this local particle field was extended to the infinity. On this basis the coexistence of (*em*) and (*g*) space-time in an infinitesimal area of a point $(\mathbf{r},t)$ can be studied by the aid of local coexisting (*em*) and (*g*) space-time particle fields regarded as extended to the infinity. Thus, the communication between (*em*) and (*g*) infinitesimal space-time around a point $(\mathbf{r},t)$ is studied by the aid of a closed system consisting of (*em*) and (*g*) particle fields regarded as extended to the infinity.

4. Communication Between (g) and (em) Space-Time Local Particle Fields

4.1. Discontinuity of Mean Values

Because of Eq. (14) matter and geometry are distributed by the same function $P(\mathbf{r},t)$. This means that a matter space time with certain characteristics creates through its distribution the real field. These characteristics are energy E, momentum P and relative space-time magnitudes SR i.e. relative time TR relative volume VR and relative length in a direction $\mathbf{n}$. These characteristics constitute the mean values of the corresponding local space-time magnitudes. The mean values of all these magnitudes belong to a unique flat matter space-time since through $P(\mathbf{r},t)$ a unique matter space time is distributed everywhere. Thus the stochastic nature of matter space-time leads to the use of flat matter space-time.

For flat matter space-time Lorentz' transformations are valid; therefore we have [1]:

$$\langle E \rangle^2 = c^2 \langle \mathbf{P} \rangle^2 + m_0{}^2 c^4 \tag{15}$$

$$E^2 = c^2 P^2 + m_0{}^2 c^4 \tag{16}$$

taking into account the QM operators and Eq. (16), we obtain:

$$\hat{E} = i\hbar \partial / \partial t, \ \hat{\mathbf{P}}_n = -i n \hbar \partial / \partial x_n, \ \hat{\mathbf{P}} = -i\hbar \nabla \tag{17}$$

$$\hbar^2 \partial^2 \Psi / \partial t^2 - \hbar^2 c^2 \nabla^2 \Psi + m_0{}^2 c^4 \Psi = 0 \tag{18}$$

We notice, because of Eqs(16,17,18), that for energy eigenvalue E, we have eigenfunction Ψ_E. We also notice that, because of Eqs(15,17,18), for energy and momentum eigenvalues $\langle E \rangle$ and $\langle \mathbf{P} \rangle$ we have eigenfunction Ψ. Therefore we have the substitutions:

$$\hat{E} = i\hbar \partial / \partial t \rightarrow \langle E \rangle \tag{19}$$

$$\hat{\mathbf{P}}_n = -i\mathbf{n}\hbar \partial / \partial x_n \rightarrow \langle \mathbf{P}_n \rangle \tag{20}$$

and the relations

$$\hat{E}\,\Psi = \langle E \rangle \Psi \tag{21}$$

$$\hat{\mathbf{P}}_n\,\Psi = \langle \mathbf{P}_n \rangle \Psi \tag{22}$$

Because of Eqs (15-22) we obtain:

$$i\partial_t \langle E \rangle + \langle E \rangle^2 = c^2 \langle \mathbf{P} \rangle^2 + m_0^2 c^4 \tag{23}$$

Thus, from Eqs(15,23) we have that $\partial_t \langle E \rangle = 0$; since $\langle E \rangle$ is position independent we have:

$$\frac{d}{dt} \langle E \rangle = 0 \tag{24}$$

Eq(24) shows energy conservation; at the same time it shows that if $\langle E \rangle$ changes then it changes in a discontinuous way. Because of Eqs (15,24) we obtain:

$$\frac{d}{dt} \langle \mathbf{P} \rangle = 0 \tag{25}$$

4.2. (em) and (g) Communication-Conservation Principles
According to the spirit of this work, Eq(25) is valid both for the (g) and the (em) space. Therefore, we have:

$$\frac{d}{dt} \langle E_g \rangle = 0 , \quad \frac{d}{dt} \langle E_{em} \rangle = 0 \tag{26}$$

Eqs(26) show that $\langle E_g \rangle$ and $\langle E_{em} \rangle$ are constant in time; however, if the (g) space-time communicated with the (em) one, the changes of $\langle E_g \rangle$, $\langle E_{em} \rangle$ should be discontinuous. We may notice that if $m_0 = 0$, Eq(16) is valid both for real and imaginary energy and momentum. Thus, we may assume that only photons ($m_0 = 0$) can convert (g) space-time into (em) one and inversely.
Because of Eqs(26) we obtain:

$$\frac{d}{dt}\left\langle E_{em-g}\right\rangle = 0 \tag{27}$$

where $E_{em} = iE_{em-g}$; E_{em-g} can express energy which can be converted from (*em*) into (*g*) form. In a closed system consisting of a real (*g*) space-time particle field and a coexisting imaginary (*em*) one, by definition, there are not photons which flow out the system while energy conversion, according to Eqs(26), takes place only through photons. Thus in the case of energy conversion we have:

$$\delta\left\langle E_g\right\rangle + \delta\left\langle E_{em-g}\right\rangle = 0 \tag{28}$$

$$\left\langle E_g\right\rangle + \left\langle E_{em-g}\right\rangle = const. \tag{29}$$

Eqs(28,29) express the energy conservation principle of the closed system mentioned consisting of a gravitational and a coexisting electromagnetic space-time particle field. *Therefore Eqs(28,29) can apply to the coexisting local space-time particle fields of 3.2.* It is noted that the energy conservation principle as it has been expressed by the Eqs(28,29) is compatible to the 1st Thermodynamic Axiom.

4.3. A Basic Property of Stochastic Space Time
Because of Eq(14) for relative time and volume it holds:

$$\overline{tr}(\boldsymbol{r},t) = \left\langle TR\right\rangle_i V_0 P_i(\boldsymbol{r},t) = \frac{\left\langle E\right\rangle_i}{E_0} V_0 P_i(\boldsymbol{r},t) = \frac{\overline{E}}{E_{0T}} V_{0T} P(\boldsymbol{r},t) \tag{24}$$

$$\overline{vr}(\boldsymbol{r},t) = \left\langle VR\right\rangle_i V_0 P_i(\boldsymbol{r},t) = \left\langle V\right\rangle_i P_i(\boldsymbol{r},t) = \left\langle \overline{vr}\right\rangle V_{0T} P(\boldsymbol{r},t) = \overline{V} P(\boldsymbol{r},t) \tag{25}$$

Thus, we have:

$$\frac{\left\langle E\right\rangle_i}{\left\langle V\right\rangle_i} = \frac{\overline{E}}{\overline{V}} \tag{26}$$

where $\overline{E}$, $\overline{V}$, are the mean energy and mean volume of the whole matter system.

The mean energy density at point $(\boldsymbol{r},t)$ on the basis of the equivalent local particle field equals to $\left\langle E\right\rangle_i / V_0$ while on the basis of the whole field equals to $\overline{E}/V_{0T}$. Thus we will have:

$$\overline{E} = \frac{V_{0T}}{V_0}\left\langle E\right\rangle_i, \quad \overline{V} = \frac{V_{0T}}{V_0}\left\langle V\right\rangle_i \tag{27}$$

$$d\overline{E} = \frac{V_{0T}}{V_0}d\left\langle E\right\rangle_i, \quad \overline{dV} = \frac{V_{0T}}{V_0}d\left\langle V\right\rangle_i \tag{28}$$

Eqs(28) imply the following conclusion:

Conclusion I: " An energy change of a matter system implies an energy change of its equivalent local particle fields".

Because of Eqs(24,27) we have:

$$\frac{d\overline{E}}{dt} = 0 \tag{29}$$

Eq(29) imply the following conclusion:

Conclusion II: "A matter space-time system appears in quantum energy states".

Notice:
Eq(29) are valid for a range of time, while Eqs(28) correspond to an abrupt change of energy.

4.4. Mean Energy – Mean Volume Correlation
According to [1] we have:

$$\langle E \rangle_i \langle V \rangle_i = hc \tag{30}$$

Taking into account Eqs(26,27,28,30) we have:

$$\overline{V} \uparrow \Rightarrow \langle V \rangle_i \uparrow \Rightarrow \langle E \rangle_i \downarrow \Rightarrow \overline{E} \downarrow \tag{31}$$

This expresses the following conclusion:

Conclusion III: "A mean volume increase of a matter space-time system implies a mean energy decrease of this system"

5. Universe Evolution

5.1. Space-Time Compatibility [1,10]
A question arises as to the meaning of the phrase "space-time contains energy". An answer could relate to the space-time compatibility. The motion -including acceleration - of a space-time with respect to another implies the existence of a relative time; inversely: *the existence of a relative time of one space-time with respect to another should imply a motion in order for those space-times to be compatible*. For the purposes of this work we will refer to this as *space-time compatibility*. An example for understanding the use of *space-time compatibility* is the following: if we regard an atom as a space-time system then the splitting of the atom corresponds to an abrupt exposition of the split parts to the surrounding space i.e. to the abrupt appearance of a high relative time which creates all space-time compatible kinds of motion, such as radiation and/or particle emission.

5.2. Universe from Zero – Evolution [1]
For a closed system, according to Eq(32), we have:

$$\overline{E}_g + \overline{E}_{em-g} = \text{constant} \tag{59}$$

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

$$\overline{E}_g{}^U + \overline{E}_{em-g}{}^U = 0 \tag{60}$$

where the superscript ^{U} indicates Universe quantities. Because of relation (31) of section 4.2, we have:

$$\overline{V}_g^U \uparrow \Rightarrow \overline{E}_g^U \downarrow \tag{61}$$

Thus, when $\overline{E}_g{}^U$ is very high, the volume $\overline{V}_g{}^U$ that contains $\overline{E}_g{}^U$ will be very small. Universe's expansion means increase of $\overline{V}_g{}^U$ and decrease of $\overline{E}_g{}^U$ as well as increase of $\overline{E}_{em-g}{}^U$ according to the Eq(60). From the Eq(60) it is derived that for positive value of $\overline{E}_g{}^U$ the $\overline{E}_{em-g}{}^U$ value will be negative. Thus, the Universe evolution is a process reverse to that of the Universe creation, and during evolution the quantity $\overline{E}_g{}^U$ decreases tending to zero, while the quantity $\overline{E}_{em-g}{}^U$ increases tending also to zero.

According to above mentioned, we notice that creation of Universe is a process of zero splitting into (g) and (em) energy. The evolution of Universe is a reverse process based on Universe's expansion. Thus the question is raised of why Universe expansion takes place.

As long as Universe is created from zero, it exists within "non existing". Therefore at the end of Universe relative time, with respect to "non-existing", always appears having as result, according to space-time compatibility, as was mentioned in 5.1, a motion towards to "the non-existing-dimensionless" which implies expansion.

According to the above mentioned, the evolution of Universe implying $\overline{V}_g^U \uparrow$ expresses the passage from $\overline{E}_g^U$ to energy $\overline{E}_{em-g}^U$; since energy is equivalent to time (Statement V of chapter 2), this passage-change expresses what we consider as Arrow of Time [1] .

5.3. Universe within "non-existing" [1]
In 5.2 has been mentioned that Universe expands towards the "non-existing". However it implies that the "non- existing" surrounds the Universe. If this is the case the length of closed a line of the end surface of Universe should be zero, since space does not exist out of Universe. At first sight, this implies that Universe's diameter should be zero. This is not true. However there are infinite paths of zero length connecting two points belonging to the ends of a Universe diameter since Universe can be regarded as a stochastic space-time formation where participates the "non-existing-dimensionless" .

6. Compatibility to New Phenomena and New Devices' Operation

6.1. General
We can assume that the charge energy $\overline{E}_{em-g}{}^U$ (see 5) is the energy sum of all the positive-negative charges regardless of whether they are joined or not. When there is an approach and coincidence tendency between positive and negative charges, which might be proton-electron couples, there is a tendency for nullification and increase of $\overline{E}_{em-g}{}^U$. Thus, the approach between electrons and protons has as a result the increase, according to 5.2, of $\overline{E}_{em-g}{}^U$ and due to Eq(60), the decrease of $\overline{E}_g{}^U$. Consequently, we may assume that the following empirical statement is valid [1].

Empirical Statement I: "During the approach of an electron with a proton there is absorption of gravitational energy".

As Empirical Statement we define a statement compatible to the theory proposed having a possibility to be verified through an experimental way. Thus a verification of an Empirical Statement will constitute a verification of the theory proposed and vice-versa. An infinitesimal energy $d\overline{E}$ converted according to Empirical Statement I can be viewed either as (em) or as (g) energy; since it can be expressed as force times displacement we may state the following Empirical Statement [1].

Empirical Statement II: Electric charges on a matter system create a gravitational field whose the acting force equals the electric field force on the system and vice-versa.

6.2. Asymmetric Capacitors, Gravitation

Empirical Statement II can be experimentally verified for the case of asymmetric capacitor systems [1]. However the question is raised of how gravitation operates between two bodies e.g. stars. According to this statement we should expect the existence of electric fields creating the gravitation. Taking into account the structure of various bodies at first sight we have neutral charge atoms or molecules where nuclei are in electrical equilibrium with the surrounding electrons. However, as Kopernicky has shown, the attraction force described by Coulomb's law is bigger than the repulsion force described by the same law [11]. On this basis Kopernicky and Hughes have shown that gravitation can be regarded as a result of electric interactions. This is in agreement with Empirical Statement II but differs from the spirit of this work; gravitation is not a secondary manifestation of electric and magnetic phenomena. Gravitation is a force required to act per unit of mass so that mass is distributed according to a probability density, a fact which is compatible to Newton's and Coulomb's Laws [1].

6.3. Photon Emission, Chemical Reactions and Light Water Electrolysis [1]

When electron of Hydrogen atom moves towards a smaller radius we have photon emission. According to the spirit of this work, this can take place according to Empirical Statement I i.e. gravitational energy absorption takes place whose a part is converted into photon emission . According to what has been accepted untill now, photon emission takes place due to potential dicreasing. However potential dicreasing means dicreasing of work production ability. Thus, according to this point of view we have work production (energy emission) because of dicreasing of work production ability. This does not define where the produced energy is coming from. According to the spirit of the present work, the energy produced due to chemical reactions can be explained; a chemical reaction can be regarded as an approaching or distancing *process of various protons and electrons.* For the same reason light water electrolysis energy production according to Kanarev and Mills can be explained [1,11,12].

6.4. Kozyrev's Radiation

According to Kozyrev's observations, the stars on which no nuclear reaction take place, are radiant and this radiation is proportional to the electrons density at the radiating area [13,14]. This shows a relation between the radiation and the said electron-proton couples. However, because of the stability of the atoms structure there is no approach between electrons and protons. Thus, the star Kozyrev radiation can be interpreted as follows: During the approaching of $e^- + P$ in the radiating star atoms, according to the Empirical Statement I, we have a gravitational energy absorption $\delta\overline{E}_g$ that is converted into radiation during their distancing. The gravitational space energy absorption is compatible, with the gravitational space energy reduction trend because of the Universe expansion (see 5.2). The approaching-distancing of $e^- + P$ takes place by means of unstable states while the electron energy eigenvalue remains constant due to the structural stability of the atoms in the radiating stars.In

a circle motion of a particle e.g. electron, an outside momentum is always required so that its momentum is continuously changing; this could take place through gravitational energy absorption which would imply a momentum interaction. Since electron's energy remains constant the energy absorbed should be radiated. This is compatible to Kozyrev radiation. It is also compatible to electron's radiation as it has been described by C. Whitney [15].

6.5. Explanation of Santilli's Etherino [1, 16,17]

We denote by E the energy level of an electron, excluding its rest energy, in a radius r in the hydrogen atom and by E_{el} the total kinetic energy, including both mass and charge, that the electron acquires during the free fall from radius $r = \infty$ to radius $r = r$. According to the Empirical Statement I we have absorption of gravitational energy δE_g during the $e^- + P$ approach. By definition, it is valid that $E = -E_{el}$; therefore the transposition from a lower energy value E_{el2} to a higher energy value E_{el1} is equivalent to the transposition from the energy level $E_2 = -E_{el2}$ to the energy level $E_1 = -E_{el1}$. If E_1 and E_2 correspond to fundamental energy levels of the electron in the hydrogen atom, then, *as it is commonly known, photon emission takes place.* Applying the energy conservation principle, we have as a result the following equations:

$$E_{el0} + E_{el2} + \delta E_g \downarrow = E_{el0} + E_{el1} + h\nu \uparrow,$$
$$\delta E_g = E_{el1} - E_{el2} + h\nu = (E_2 - E_1) + (E_2 - E_1) = 2(E_{el1} - E_{el2}) \qquad (33)$$

Where E_{el0} is the total electron rest energy related both to mass and charge which charge is regarded as an imaginary mass. The energy δE_g is converted partly into photons i.e.:

$$h\nu = E_{el1} - E_{el2} = \delta E_g / 2 \qquad (34)$$

and partly to energy increase at level E_{el1} i.e.:

$$E_{el1} = E_{el2} + \delta E_g / 2 = E_{el2} + E_{el1} - E_{el2} \qquad (35)$$

Taking into account the above mentioned, we conclude that the electron when approaching the proton increases in charge until it is valid that:

$$Q_{proton} + Q_{electron} = 0 \qquad (36)$$

Taking into account the above mentioned we can reach to results compatible to the following reaction:

$$\alpha + e^- + P \rightarrow n \qquad (37)$$

which corresponds to charge disappearance, to neutron production, and to energy absorption (0,78 MeV). Reaction (37) has been proposed and theoretically explained, by introducing a particle α (0,78 MeV) named etherino according to Hadronic Mechanics by R.M. Santilli[1,14]. According to the minimum contradictions point of view charge is regarded as electromagnetic imaginary mass; therefore it can be taken into account for the energy balance of reaction (37) [1,16,17].

6.6. Bodies' Expansion

Because of Eq(30) for a particle field we have:

$$\langle E \rangle = \frac{hc}{\langle V \rangle} \tag{38}$$

$$\langle V \rangle \uparrow \Rightarrow \langle E \rangle \downarrow \tag{39}$$

Because of Eqs(38,39) for reasons of energy balance, photon emission is needed since any energy change takes place through photons (see 4.2). On this basis Hawking's black hole radiation can be explained [1,18]; in this case $\langle V \rangle \uparrow$ is compatible to Universe's expansion which is due to space time compatibility at its "End" (see 5.2). Taking into account relation (31) (see 4.2) we may conclude that for the same reason all bodies - *as long as they can be regarded as Quantum Matter-Space-Time Formations* [1] - might be expanded the earth included [19].

6.7. A Basic Conclusion of (g)+ (em) Interaction.

On the basis of what has been mentioned we may conclude that the interaction of (g) with (em) space time is of great importance. Energy conversion-conservation and momentum action take place through photons whose rest mass equals to zero; it is noted that any observable radiation consists of "photons" having rest mass [1]. Therefore through the (g)+ (em) interaction, particles can acquire mass and momentum without the need of Higgs' boson. This might have some importance in the case of CERN experiment weakness for this boson to be detected [16,17].

References

[1] A.A.Nassikas, **"Miminum Contradictions Everything"**, Rev. and Ed. M.C. Duffy and C.K. Whitney, ISBN: 1-57485-061-X, Hadronic Press (2008).

[2]. C.K. Whitney, Personal Contact (2001).

[3] A.A. Nassikas, "A Claim for Minimum Contradictions in Physics", **a)** Congress 2000, St. Petersburg; Russia. **b)** Galilean Electrodynamics **12**, Special Issues 1, GED-East, 14-16 (2001).

[4] A.A. Nassikas and P.F. Parshin, 2000. "On the Possibility of a Unique Axiom in Physics", a) Congress 2000, St. Petersburg, Russia; b) Galilean Electrodynamics- East, Special Issues II, 2001.

[5] M.C. Duffy, "PIRT Book Publication Project", personal contact, 2005.

[6] A. Pais, **Subtle is the Lord: The Science and the Life of Albert Einstein** (1982).

[7] R.M. Santilli, "Lie-Admissible Invariant Origin of Irreversibility for Matter and Antimatter at the Classsical and Operator Levels", http://arxiv.org/abs/physics/0601061.

[8] P. Rowlands, "The Factor 2 and Physical and Mathematical Duality". Proceedings PIRT VIII, London, Ed. M.C. Duffy (2002).

[9] B. Mandelbrot, **The Fractal Geometry of Nature** (Freeman, N.Y., 1977).

[10] A.A. Nassikas, "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, 1994.

[11] Ph. Kanarev, **Water as a New Source of Energy**, Second Edition (Publ. Kuban State Agrarian University, Krasnodar Russia, 2000).

[12] R.L. Mills,. "Energy/matter Conversion Methods and Structures", International Patent Publication Number WO 92/10838, Infinite Energy **3**, Issue 17 (1991).

[13] A.N. Dadaev, "Astrophysics and Casual Mechanics", Galilean Electrodynamics **11**, Special Issues 1, GED-East, 4-7 (2000).

[14] A. Frolov,1998. The Source of Excess Energy. Infinite Energy, Vol.(4) Issue 20.

[15] C.K. Whitney, "Do Atoms Really Have 'States'?", Proceedings of PIRT VIII, London, Ed. M.C. Duffy (2002).

[16] R. M. Santilli, "Neutrino and/or etherino?" Foundations of Physics **37**, 670 (2007) [1A]; for extensive studies see also R. M. Santilli, **Hadronic Mathematics, Mechanics and Chemistry**, Volumes I, II, III, IVand V, International Academic Press (2008) also available as free downloads from the web site http://www.i-b-r.org/Hadronic-Mechanics.htm.

[17] A.A.Nassikas, "Santilli's Etherino Under the Claim for Minimum Contradictions" Hadronic Journal Vol.(3) (2008)

[18] A.A. Nassikas, "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, (1994).

[19] D.S. de Hilster, "The Growing Earth". NPA Conference Albuquerque, US (2008).