A possible theory for particle composition of matter based on only three functional quantum particles

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Abstract. This work presents the possibility of revising the standard model of subatomic composition of matter, extending the "*inverse square law"* from gravity and electric fields to also the thermal effects. It is shown that assuming only three proposed particles and only three relevant interactions, simple explanations can be provided for all natural phenomena, particularly those in which the existing theory does not provide documental and convincing answers. The paper starts with the description of a unique reaction between two types of the proposed subatomic particles thus producing the so-called 'thermions' that finally form an elastic Cubic Energy Grid under mechanical stress. Then the existence of the three known phases of matter is explained. The meaning of 'heat' is redefined without focusing on the usual kinetic energy of atoms and molecules. The elimination of anomalies in a closed system is explained through an asymmetrical oscillation. Also, the paper attempts a new interpretation of the creation of the universe from a huge electric discharge based on the simultaneous creation of the three subatomic particles. It describes 'monopoles' as the first quantized agglomerates of pure energy and explains why they bound to form 'dipoles', which later progressively form larger agglomerates. In the sequence, it describes the crystallization as a first resistance line that the nature foresight to avoid the self-destruction of the universe. The paper closes with possible models of electron and positron as well as of neutron and proton based on only the three proposed subatomic particles. At the same time, the equivalent mass of a thermion as well as the quanta of positive and negative electric charges is determined.

Keywords: Subatomic particles· Cosmology·*Θερμιόνια.*

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Nomenclature / Glossary

q^+	*Θετικόνιον*	(Spelling: *Thetikonion*, is the positively charged elementary quantum)
		In plural: *Θετικόνια*
q^-	*Αρνητικόνιον*	(Spelling: *Arnitikonion*, is the negatively charged elementary quantum)
		In plural: *Αρνητικόνια*
θ	*Θερμιόνιον*	(Spelling: *Thermionion*, is the thermal elementary quantum; in English: thermion)
		In plural: *Θερμιόνια*
	Ουδετερόνιον	(Neutronion, is an equivalent term to the above 'Thermion', which manifests the absence of electric charges)

Electric charge of electron	$q_e = 1.60218\times10^{-19}$ C (standard)
Mass of electron	$m_e = 9.10938\times10^{-31}$ kg (standard)
Equivalent mass of *Θερμιόνιον*	$m_\theta = 1.05433\times10^{-33}$ kg
Equivalent mass of *Θετικόνιον*	$m_{q^+} \cong 14m_\theta = 1.47606\times10^{-32}$ kg
Equivalent mass of *Αρνητικόνιον*	$m_{q^-} \cong 14m_\theta = 1.47606\times10^{-32}$ kg
Equivalent mass of electric couple ($q = q^+ + q^-$)	$m_q \cong 28m_\theta = 2.95212\times10^{-32}$ kg

k	Coefficient relating the mass of electric charge with a thermion ($k \cong 14$)
u	Velocity
λ	'Phase of matter' determination factor (or coefficient of coherence)

1. Introduction

Today most theorists in physics and other related scientists believe that the natural world is completely described by the so-called "standard model", which accepts the existence of four particles (electrons, neutrinos, up quarks and down quarks) and four interactions (gravity, electromagnetism, strong interaction and weak interaction) [1-3].

However, although the standard model provides an adequate theoretical framework for interpreting a variety of natural phenomena, there are still numerous theoretical efforts to systematize and/or consolidate the four fundamental interactions [4-6]. The last time indeed, expected developments are dependent on the confirmation or rejection of Higgs bosons [7,31].

Historically, '*… we can appreciate Newton's discovery of the law of gravitation as the first "unification" in the history of science, uniting the laws of heaven and earth*.' [24,p.19], while '*… the next great leap in our understanding of unification –that of electricity and magnetism– took place two hundred years later, in the mid-1860s, …, by Clerk Maxwell*.' [24,p.20]. Also, '*… only within the last twenty-five years, however, have scientists understood that even the weak force can be treated as a manifestation of the same force. The Nobel Prize in 1979 was awarded to three physicists (Steven Weinberg, Sheldon Glashow, and Abdus Salam) who showed how to unite the weak and the electromagnetic forces, called the "electro-weak" force. Similarly, physicists now believe that another theory (called the GUT, or "grand unified theory") may unite the electro-*

weak force with the strong interactions'. Moreover, many physicists claim that the 'superstrings theory' bridges the gap between Quantum Mechanics and Relativity. It is worth-mentioning that on the latter issue, world-renowned Dutch physicist Gerardt't Hooft, went so far as to compare the fanfare surrounding superstring to "American television commercials" –all advertisement and very little substance [25].

The current research trend is to investigate the existence of more and more particles, which is against the logic that, as we move into the microcosm should the complexity to be reduced in order to arrive sometime in the ultimate building block, the one, the "*άτομον*–atom". Instead, the first structure of matter models developed in antiquity by Greek philosophers (e.g. Leucippus first half of 5th century BC, and Democritus 460-370 BC) were based on simple physical concepts [8,9].

The above view is also shared by the renowned physicist Stephen Hawking, who argues that "*if we do discover a complete theory it should in time be understandable in broad principles by everyone, not just a few scientists*" [10]. Quite similar is also our view, in which the overall functioning of nature must be done by ordinary laws which are revealed to us through some familiar macroscopic phenomena.

In this paper, we show that assuming only three proposed particles and only three interactions (forces) we can explain all natural phenomena and particularly those simple phenomena in which existing theory does not enable us informed and convincing answers. Mention some examples, such as:

- What precisely are the nature and propagation of light as well as the heat transfer?
- Is there a medium of light propagation and a coherent form of Aether?
- What explains the creation of forces from a distance?
- What explains wave-particle dualism and why the particle nature of light emerges only in emission and absorption?
- What explains the two-slit phenomenon, without requiring the photon to pass simultaneously from the two slits and to contribute to itself thereby circumventing the concept of a single photon and the concept of interference?
- What is dark matter?
- What is quantum gravity?
- Why the matter appears in solid, liquid and gaseous form?
- Why the asymmetry between matter and antimatter. What happened to the antimatter?
- What are the building blocks of matter and what is the structure of the electron and positron? Of proton and neutron?

Above, we have given the characterization 'enigmatic' to the strong nuclear force. It is well known that, after many attempts to determine, in 1954, Yang and Mills [11] derived the equation of motion of the **b** field, of the form: $\partial \boldsymbol{f}_{\mu\nu}/\partial \mathbf{x}_\nu+2\varepsilon(\mathbf{b}_\nu*\boldsymbol{f}_{\mu\nu})+\mathbf{J}_\mu=\mathbf{0}$, where $\mathbf{J}_\mu$ is the spin-1/2 field, and $\boldsymbol{f}_{\mu\nu}$ a vector that relates the isotopic-gauge covariant field quantities $F_{\mu\nu}$ with the angular momentum **T** [11,eq.(12)]. Despite the *mathematical* importance of this equation, which postulate was a source of inspiration for some of the most excellent works in physics [12-14], we feel that it has probably little to do with the physical *reality*. Yang and Mills knew the charge and isotopic spin of the new particle field, but they were completely unaware of their mass, a fact stated at the end of their article "*We have therefore not been able to conclude anything about the mass of the* ***b*** *quantum*» [11, p.195]. Besides, the range of the strong interaction, 10^{-15} m, as much about the diameter of the nucleus, is also enigmatic.

To prepare the reader follow the text, we should mention from the outset two things. First, due to the quite innovative nature of the three proposed elementary particles, and in order to avoid confusion of the new-coming terms with the standard terminology, in this text we use their Greek names while an English translation is given in the Glossary. Second, due to the long report of the entire relevant research (a textbook of 256 pages in the Greek language [28]) we had to divide our paper in two parts. This work is the Part I whereas Part II will follow as an independent text [29].

Part I, which is this paper, is structured as follows. *Section 2* deals with the proposed model of subatomic particles, as well as with the description of a unique reaction occuring between two types of the proposed subatomic particles (electric charges) thus producing the so-called 'thermions' that finally form an elastic Cubic Energy Grid under mechanical stress. *Section 3* deals with the three proposed interactions and explains the existence of the three known phases of matter (solids, liquids, gases). *Section 4* discusses a new definition and content of the term 'temperature' without focusing on the usual kinetic energy of atoms and molecules, explains the role of asymmetric oscillations in the decay of energy anomalies in a closed system, and explains the several types of energy. *Section 5* discusses an attempt for a new interpretation of the creation of the universe coming from a huge electric discharge based on the simultaneous creation of the three subatomic particles. It describes 'monopoles' as the first quantized agglomerates of pure energy and explains why they bound to form 'dipoles', which later progressively form larger agglomerates. *Section 6* deals with the resistance lines of the universe against its self-destruction; however, it reduces only to the first resistance line (crystallization). Although the authors propose three more subsequent resistance lines, they found it difficult to include all their thoughts in a sequential way (the continuation will be given in Part II). Therefore, *Section 7* continues with the structure of matter, which is divided into three subsections as follows. Section 7.1 deals with the Electron and Positron, Section 7.2 with the Neutron, and finally Section 7.3 with the Beta Decay and the Proton. In the same section we theoretically determine the most important values of the equivalent mass for the positive and negative electric charge quanta (*θετικόνια*, *αρνητικόνια*) as well as the mass of the thermions (*θερμιόνια*).

The tentative contents of **Part II** (forthcoming paper [29]) are as follows. First it deals with details on the thermions-lattice, which is the basis for the proposed *thermo-aether* and also relates the geometric data as well as the temperature of the aforementioned lattice with the velocity of light propagation. Second, after the new ideas are thoroughly explained, the discussion started in Section 6 of Part I is completed by discussing three additional lines of resistance, which are (i) the change of material phase, (ii) the Beta Decay, and (iii) the Fusion.

2. The proposed model of subatomic particles

Within the possible existence of simple natural laws, we recommend that the matter may consist of the following three subatomic particles:

- ***Θετικόνια*** (positively charged elementary quanta): (q^+)
- ***Αρνητικόνια*** (negatively charged elementary quanta): (q^-)
- ***Ουδετερόνια*** (uncharged elementary quanta)

All these three particles are considered to consist of the same "*raw material*", i.e. the *quantized pure energy*, thus, is considered to be the *sole* component of matter in the universe.

In the proposed perspective, energy and matter are *identical* concepts. More specifically, the various objects we perceive through our imperfect human senses, in reality is nothing other than *pure agglomerated quantized energy arranged in space in different ways*, so as to give the impression of the huge variety we see around us. In other words, we claim that there is not a variety of material bodies but only a variety of spatial arrangement of these three subatomic particles.

Then, due to the significant role the quantized energy plays into creating any physical entity, we describe from the beginning four *embedded* (inherent) basic properties of this pure energy to understand the processes leading up until we reach the current state of the universe.

A) **Density** of pure energy, like on conventional materials, is the ratio of the mass of condensed energy, in g (grammars), lying in a given area divided by the volume of this space, in cm^3. The range of density for the hitherto known material bodies vary between 0.08988×10^{-3} (g/cm^3) for hydrogen (0 °C, 101.325 kPa) until 10^{15} for neutron stars. Note that the density of neutrons (and protons) that form the nuclei are of the same order of magnitude as that of neutron stars ($D_n \cong 10^{15}$ g/cm^3). Assuming that quantized energy is of a spherical shape, and the neutron (possessing the highest known density) is crystallized in the cubic system, then the *atomic packing factor* of components is $\pi/6=0.524$ [15] and therefore the *density of pure energy* is $D_n/0.524 = 1.91D_n = 1.91\times10^{15} g/cm^3$. Therefore, we are entitled to assume that the density of pure energy of which the three proposed basic subatomic particles consist, and which we consider as the *maximum allowable density* existing in nature, is equal to 1.91×10^{15} g/cm^3.

B) **Inertia** is the property that the quanta of pure energy show to appear resistance to any change in their kinetic condition, a property that is transferred from conventional materials. Inertia is also the property that gives substance to the meaning of time. According to the proposed theory, "*time is the observed delay in initiation of two successive elementary events of a process under stable conditions*". Obviously, this definition is not consistent with any expansion or contraction of time. Without inertia, the various procedures would be performed instantaneously, so the time evolution of the universe would be zero and, therefore, there would be no evolution.

C) The quanta of pure energy *act as a source of field forces and they interact.* More specifically, similar energy quanta have the inherent ability to *repel* while *dissimilar* to *attract* one another. If we restrict to the first two particles, i.e. *θετικόνιον* and *αρνητικόνιον*, these (positive and negative, respectively) electric quanta are also the simplest "*anti-particles*" that exist in nature.

D) When dissimilar *electrical energy quanta* (q^+, q^-) attract one another and thus come in contact, they *neutralize* and *decompose into smaller electrically neutral* quanta of energy, those we have already called *ουδετερόνια*, according to the following schematic reversible reaction:

$$q^+ + q^- \rightleftarrows 2k\theta \qquad (1)$$

where *k* is a dimensionless constant whose numerical value will be estimated in subsection 7.2. According to the proposed model, the novel ουδετερόνια (let them call in English as 'neutronions') in which electric antiparticles decay [Eq(1)] comprises the *smallest independent quantized amount of pure energy* that exists in nature. Conceptually, it is something similar to the "atom-άτομο-*άτμητο*" ("no further subdivision") in Democritus sense [7,8]. These smallest quanta of pure energy, the new 'άτομα', are also, as will be shown below, the quanta of *thermal energy*. For this reason, hereafter we call them *Θερμιόνια* (thermions) (θ). The compact electric energy is considered to be of higher energy level compared to the produced thermal energy, the latter being of lower energy level. This conversion is the most *fundamental* property of the quantized energy and is the only reaction in the entire universe which *produces work*, as a result of the expansion of the produced thermions, as graphically is depicted in **Figure 1**.

After introducing the four basic axioms upon which the proposed theory is based, we analyze further the *transformation phenomena*. The reaction described by Eq(1) being bidirectional –at this stage of evolution of the universe– naturally takes place from left to right. This fundamental reaction is 'hidden' behind all chemical and nuclear reactions. Therefore, in the proposed model, the *Heat* is an *independent and autonomous* form of quantized energy, the properties of which are determined by purely *dynamic causality laws*. This contrasts with the *standard model* of heat that determines it by *statistical methods* (irregular and chaotic Brownian motion), and will be analyzed immediately after the presentation of the proposed forces (Section 3). At this point it is worth-mentioning the recent philosophical concerns about the relationship of gravity and heat [17].

3. The proposed interactions

The fact that the three proposed subatomic particles consist of the same raw material, that is the pure energy, and differ only in their size [cf. Eq(1), Fig.1], in conjunction with the fact that two of them (the electrical charges q^+ and q^-) are accepted to be sources of force field development interacting in accordance with the inverse square law (Coulomb' Law), suggests that (in our view) no reason thermions, which are also pure energy quanta, not to create similar force fields and interact in a similar manner.

The overall possible combinations of the three ways proposed subatomic particles lead to the following three interactions:

$$F_1 = k_1 q^2 / r^2 \qquad \text{Electric Force (Attractive or Repulsive)} \qquad (2a)$$

$$F_2 = k_2 q\theta / r^2 \qquad \text{Electrothermal Force (always Attractive)} \qquad (2b)$$

$$F_3 = k_3 \theta^2 / r^2 \qquad \text{Thermal Force (always Repulsive)} \qquad (2c)$$

The abovementioned three forces are proportional to the inverse square of the distance *r* and their range is infinite ($0 < r < \infty$). Obviously, the first case (2a) corresponds to the well known *Coulomb's law* (1784) in which *q* may represent either of q^+ or q^-. The quanta of thermal energy, *θερμιόνια* (thermions), which also consist of pure energy quantized, there is no reason not to act as source of field forces, i.e. of *thermal forces*, described by the proposed Eq(2b) and Eq(2c). From these two equations it is readily apparent that the quanta of thermal forces follow the general rule of interaction: i.e. identical quanta repel whereas dissimilar attract. The agglomerates of quantized energy,

which we perceive as material bodies, are electrically neutral and balance. Therefore the electric quanta within these agglomerates must be in pairs (positive-negative) and be insulated from each other. The role of the insulating medium is undertaken by the electrically neutral *θερμιόνια* -thermions (detailed analysis is given in Section 7). In addition, under the interactions of *electrical forces* (attractive for dissimilar quanta and repulsive for similar quanta), of the always attractive *electrothermal forces* and, the always repulsive *thermal forces*, the quanta of electric and thermal energy (building blocks of conventional material) in order to balance the action between them and depending on the *composition of the aggregate*, one of the following phases should occur:

a) To prevail attractive forces. Therefore, the quanta approach each other and build a progressive *cohesion* of the material body (according to the final value of the attractive force). Then, the created material bodies will appear as *solid objects* of proper cohesion. As a result, the solids present fixed shape and volume.

b) The attractive and repulsive interactions are almost equal (slightly above or below zero). Therefore, we have a loose cohesion of aggregates and the material bodies obtain the *form of liquids with proper viscosity*, from high to low. As a result, the fluids have a constant volume, but no fixed shape.

c) Finally, it is possible the repulsive forces to dominate and agglomerates of quanta be repelled each other, thus forming *gases*. A direct consequence of the gases is that they do not have either a fixed volume or fixed shape and occupy the entire space offered.

From the above analysis it is clear that the *cohesion* of material bodies and separation into solids, liquids and gases, depends only on their composition and more specifically on the proportion between the number of pairs of electric charge q and the number of thermal loads θ, which will be denoted by the coefficient $\lambda = q/\theta$ named as "*phase of matter determination factor*". In this simple way the proposed theory explains the existence of three phases of matter we observe today, whereas in Section 7 we give a detailed explanation of the composition of materials.

With these three forces alone, without having to use the enigmatic *strong and weak* interactions, the Nature not only ensures the cohesion of the nuclei of atoms (the structure of which will be described below) but also it precisely defines the nature of *gravity*, the empirical formula $F = G\ (m_a m_b)/r^2$, which the proposed theory identifies in a theoretical way as the resultant force of the electrical, electrothermal and thermal interactions of subatomic particles that make up the extensive material bodies. In other words, in the proposed theory the gravity does not exist as an independent fundamental force. Again, we feel that the determination of gravity as one of the four fundamental forces in the standard model, is the very reason of the failure in efforts for decades to combine gravity with electromagnetic forces.

From the above brief description of gravity in the context of proposed theory, we can easily conclude that gravity, as the resultant of attractive-repulsive electrical, electrothermal and thermal forces depending on the composition of material bodies (accepted today), not only is variable but it can be made even repulsive, as for example occurs in evaporation of fluids or even in sublimation of solids when heated. A similar concern raised by another author [17].

Heating, according to the proposed theory, means addition of thermions which alter the composition (the ratio $\lambda = q/\theta$) of materials, thus prevailing the thermal repulsive forces between molecules of materials. Therefore, initially a volume expansion occurs, which eventually leads to the evaporation of the body (motion opposite to gravity). The usual

explanation that heat increases the kinetic energy of molecules is obviously true but it is a *secondary process*, which we explain below. Something similar happens with the expansion of the universe where the warmer galaxies repulse one another.

Summarizing the current data, the proposed theory addresses the creation and evolution of the universe, using:

-A single material, i.e. the quantized pure energy.

-Only three basic subatomic particles, i.e. *θετικόνιον*, *αρνητικόνιον* and *ουδετερόνιον* (the latter is equivalent to *θερμιόνιον*: thermion).

-Three fundamental interactions: Electrical (attractive-repulsive), Electrothermal (attractive) and Thermal (repulsive).

-A single reaction: $q^+ + q^- \rightleftarrows 2k\theta$. This new coming reaction, which does not violate either the law of 'energy conservation' or the law of 'electric charge conservation', is just the measure of what we now characterize as a *mass deficit* or 'missing mass'.

Finally, concerning the values of the coefficients k_2 and k_3, we believe that these have to be determined experimentally or perhaps by solving a number of properly chosen test cases (inverse problems).

4. Proposed redefinition of temperature

In this section, we come back to support our claim that the thermal energy is a self-existent and separate granular (quantized) energy.

While standard theory considers the *temperature* of a body as a measure of the average kinetic energy of its atoms and molecules, the proposed theory accepts that the measure of temperature *is the average density of thermions* into it, i.e. the number of thermions per unit volume. This in turn implies that it is a measure of the average distance *r* between the free thermions and which defines by virtue of Eq.(2c) the size of the repulsive forces between them.

Apart from the size of the repulsive forces, the property of thermions to repel one another, determines the *relative position* between them, which obviously cannot be accidental, but enough *to ensure the equilibrium of forces in the system*. This property of free thermions to repel one another *while balancing between them* is very *crucial*, since thermions form an *Elastic Cubic Energy Grid under mechanical stress*, as graphically shown in **Figure 2**.

Under the above definition of temperature, the *temperature zero* (*Absolute Zero*), is the temperature that corresponds to zero density of free thermions a body. At any temperature greater than absolute zero, every material body contains a number of free (repelling one another) thermions which, due to their capacity to interact with electric charges, generate stresses in the grid of the material body, i.e. the *thermal tensile stresses* in all the bodies having temperatures above the absolute zero value.

These thermal stresses, determine the size of the material bodies as well as the cohesion forces of them. The thermal tensile stresses are proportional to their respective distances (*r*) between free thermions, i.e. the temperatures of bodies.

Similar to existing theory, we match the density of thermions corresponding to the temperature of melting ice at atmospheric pressure as the temperature range 0 degrees

Celsius, and 100 degrees Celsius to the density thermions for the temperature of boiling water at atmospheric pressure.

About the feeling of ‘hot’ and ‘cold’ we can very easily give the following explanation. The feeling of '*hot*' is created when thermions move from a warmer object ‘*towards our human body*’ in order to bring about thermal equilibrium. This motion is due to the superposition of repulsive interactions first of thermions located within the hot object and secondly, the repulsive interactions of thermions in our human body with the thermions lying on the surface of the material object in contact with us. Obviously, in the perception of hot the resultant force is directed from the hotter body to our human body.

Conversely, when thermions move from our warmer human body to the material object or the environment, for the same reason mentioned above, thermions move from the human body to the material object and we have the feeling of ‘*cold*’.

The *intensity* of the sensation of hot and cold is also depended on the speed with which the thermions are directed to or from our human body.

The mechanism of movement of thermions will be developed in more detail immediately below, when we discuss the subject of heat transfer. Here we mention yet that the speed with which the thermions move within a material body or from a material body on another depends on the *temperature difference* between the two bodies as well as the thermal conductivity of the material body to which directed, and which is a *measure of resistance* that presents the material in the removal of thermions.

Something very similar happens with the resistance posed by objects in movement of electrical charges. When somebody catches a piece of timber (a poor conductor of heat) and a metal (good conductor), which both have the same temperature, the wood seems warmer than metal because the speed at which thermions move in the bad conductor (outcome of resistance raised by the conductor in thermions motion, which is the result of the structure of material bodies) is less than that in a good conductor. So, somebody creates the false impression that the wood is less cold than metal.

For different material bodies, comparing their coefficients of thermal conductivity and specific electric resistance (at the same room temperature), we see that good electrical conductors such as metals are generally good conductors of heat. Poor conductors of electricity, such as wood and ceramics, are also poor conductors of heat. This *similarity* of behavior on the electric conduction and thermal energy advocates the granular nature and thermal energy. The difference in specific resistance between electrical conductors and insulators is around 10^{15}-10^{18}. Instead, the difference in thermal conductivity between the thermal conductors and insulators is only around 10^{3}-10^{5}, approximately. Result of this is the visual observation that, whereas we can direct the electrical current in predetermined paths as in printed circuits or coils, it is impossible to reduce the thermal currents in similar routes excepting only to a minimal extent.

Since the flow velocity of a granular fluid through a duct with a specific resistance is inversely proportional to the diameter of the grains [16], the aforementioned property of the heat not to be directed at predetermined routes but to diffuse through the insulator, allows us to assume that if the heat has a granular structure, the size of its ‘*quanta*’ must be clearly lower than that of electric charge, a fact that allows them to ‘escape’ more easily from the surface of wires, overcoming the ‘threshold’ of critical energy.

After this break, in order to define the concept of temperature (which we need below) we return to the question of the nature of heat.

Because the heat goes into a multitude of physical and chemical processes and because the proposed definition is different from the standard model of heat, we will insist a little longer to prove our claim. First we should mention that there is no doubt that the agglomerated energy (atoms and molecules that make up matter) are in a continuous motion at a kinetic energy (½ mu^2). Also, it is undisputed that the warming of the material body would increase their kinetic energy.

Although for the last two centuries the existing theory of heat explains various thermal phenomena with sufficient effectiveness, the standard model has some weak points where we believe the proposed theory responds better. The most essential of these weak points are the idea of i*rregular and chaotic* motion of atoms and molecules of material bodies in order to explain the *heat transfer*.

As argued in the standard model, the atomic theory says that the heat transfer from a warm body to a cold one is based on the fact that the *kinetic energy* of the molecules tends to approach the mean average, *provided* between molecules innumerable collisions occur. It is reminded that existing theory predicts for $1cm^3$ of a fluid about 10^9 collisions per second between molecules.

Between states in which a system of bodies can be found, *most likely* is one where all the bodies have the same temperature. This single event supports the law that heat transfer always tends (on average) to equalize temperatures and that it is directed from higher to lower temperatures. However, in order the standard model to ensure the validity of the aforementioned law, it is necessary -*from a theoretical point of view*- to introduce the hypothesis of elementary *disorder*. Generally, *unless the circumstances are very exceptional* (failure point of existing theory) the kinetic energies have to *some extent* be mixed, which implies the equalization of the temperatures of two bodies. All results derived in this way agree with the observation *particularly in the case of gas* (another point of weakness). According to the speed curve (Maxwell-Boltzmann distribution), the velocities of gas molecules in a specific temperature are very different and have a huge range. So, during the heat transfer the molecules of both material objects will have to obtain a new specific distribution, which should reflect the new temperature. But such a process is very complicated to be able to rely on the only evidence of random and chaotic motion of molecules as well as the innumerable collisions, therefore very risky to be a law, of such a fundamental process of physics that is heat transfer (point of weakness).

From the above it is evident that the kinetic state model of the gas is purely probabilistic. However, it is known that information from such models may reflect *with sufficient precision* the reality, but may not. According to Chaos Theory, *small initial deviations* can lead to huge differences in the final result and will result in misleading conclusions. Proof of our claim is that, using the probabilistic model is not ruled out all the gas molecules be found clustered in one part of space containing them, which of course has never been observed so far. Rather it is all accepted that the gas occupies the space being offered. This visually confirmed observation in gas behavior is *entirely consistent* with the existence of repulsive forces between its molecules, a fact which supports the proposed theory. The latter constitutes another point of disagreement of the standard model with observation of reality.

Therefore, many strictly proactive researchers do not agree at all and appreciate as highly risky the huge step that is attempted to assumptions of questionable validity [30].

But to identify, with the current standard model, accurately the quantity of heat contained in a material body, using *dynamic laws*, we should know at any moment the masses,

positions and velocities of all those trillions of trillions of atoms and molecules existing in a very small amount of material (1 cm^3 air contains approximately 2.7×10^{19} molecules). Knowing these values for each molecule separately, *at any time*, of course, is inconceivable, so to overcome these serious obstacles, scientists *necessarily* rejected any thought of a *deterministic dynamic method* of continuous monitoring would be the unequivocal and reconciled with the probabilistic model. This created a *model* of molecular motion of the three phases of material bodies (solids, liquids, and gases), in which the information is of general nature and does not concern individual particles but sets with large numbers of particles (such as information related to the volume, pressure and temperature of a gas).

Today almost all physicists who has accepted the inductive methods, believe that heat is chaotic and disorderly motion of molecules and that the heat transfer, like all non-reversed phenomena are governed, not by dynamic, but by statistical laws, i.e. probability laws, with all the consequences that may result in this view. Such compromises should, in our view, be unacceptable.

Unfortunately, this forced assumption is not the only that we meet in the various theories of physical science. As one of the most typical assumptions forced, we report the propagation of light in vacuum. There is no doubt that this premise is a result of the inability to find a consistent means of light propagation, as would be some sort of aether, so we do not know exactly what the electromagnetic wave is.

Always according to the current theory, the picture of molecular motion differs substantially from situation to situation (**Figure 3**).

Thus in *gases* for the longest time, each molecule moves in a straight path *without interaction* and then to a small area, it changes the direction of motion as a result of shocks with other molecules. The distance traveled by the molecule between collisions with various other molecules is hundreds of thousands of times greater than the diameter of the molecule. The trajectory of a gas molecule is represented by **Fig.3a**. It is worth-mentioning that this model is not applicable in the case of compressed gases.

In the *solid* phase, atoms and molecules are very '*tied*' together in fixed positions (**Fig.3b**) and form a crystal lattice. The motion of atoms and molecules in the solid is an *oscillation* around some fixed locations called *nodes of the crystal lattice*. The atoms and molecules generally cannot leave a small area around the nodes.

The theory of motion of molecules in the *liquid* state is *unclear*. However, the relative positions of molecules and atoms of a fluid are not fixed as in a solid, and they change position in relation to each other, comparatively much slower than the molecules of gas. However, the motion of molecules of the liquid is *free of collisions* between molecules, but a *simple slip*, as we can see from the *approximate trajectory* of a fluid molecule in **Fig.3c**.

In principle, the description of the kinetic state of the molecules in fluids includes serious uncertainties such as in the motion of molecules of gas (without interaction), the kinetic state of molecules of liquid which is not quite clear, and the approximate orbits, and there are not the requisite shocks which the model predicts, et cetera. Also, the standard model divides the three phases of matter into three different categories of physical forms, which is completely arbitrary since the only essential difference among them (gas, fluids, and solids) are the different cohesion forces between their molecules.

It is natural that in fluids with zero and negative cohesion, a very small *external disturbance* causes a *temporary* disorderly motion of molecules which stops just after the action of an external event that caused it.

The baseline equilibrium after the cessation of action of the external cause can be seen visually in liquids, which return to equilibrium as quickly as much more viscous (higher inertia) they are.

Our belief is that when a fluid is inside a sealed and thermally insulated container, in order to exclude the effect on their molecules externalities, there is no reason that forces the molecules to move to a different drive than that occurring in the entire universe, which is an *oscillation* (see below).

Regarding the *Brownian motion,* which relies on the standard model to confirm random and chaotic motion especially in the fluids, we report that the homogeneous media have an inherent capacity *not allow energy anomalies* in the mass and to tend to smooth out with a special oscillation. The addition thus pollen grains in the liquid with different densities and composition, disrupts the homogeneity of fluid, with the natural effect of creating a disturbance of the liquid in an effort to streamline and eliminate energy anomaly, so as to revert to a state as possible more homogeneous. Macroscopic verification of the intrinsic property of fluids not to accept energy anomalies in their mass, is when a drop of color is added in the water, or a drop of perfume in a closed space. In short time we can see that the colored droplet has spread throughout the mass of water and detect fragrance molecules at each point of the closed area. Moreover, the lighting of the liquid to be able to see the motion of molecules is that which alone could cause the disorder of molecules apart from some other exogenous factors such as non-uniform heating of the specimen from the surrounding area.

After all we reported above, let us look at how *random and chaotic* the motion of molecules is and consider first the solids. According to the model of **Figure 3b**, a *single* molecule of a solid body can participate in a chaotic and arbitrary oscillation around the node of the crystal lattice, as shown in the same illustration. But can *all together the molecules* of a solid body perform a chaotic and random oscillation, without the collapse of its structure? Our answer is *emphatically NO,* and our belief is supported on the following event.

According to what we reported at the beginning of our description for the density, in the water (density $1 g/cm^3$), the percentage of space occupied by the material (quantized energy) is only 0.524×10^{-15} % of the total area, in the Hydrogen it is a 0.05×10^{-15} % and in the denser material on Earth, that is Osmium, it is only 17×10^{-15} % of the space. We observe that the volume occupied by the quantized energy in known materials on Earth *is a negligible quantity* compared with the 'empty space'. This fact alone is not enough to ensure the molecules of disordered and chaotic motion.

We tend to represent solid bodies with tangent spheres covering most of the area, as shown in **Figure 4a** (sodium chloride), whereas the reality is that shown in **Figure 4b**, where 'material' occupies a slightest space and around them very strong fields interact.

The fact that the fields on atomic level are powerful is realized from our experience when trying to compress a solid body, where despite the huge forces exerted the volume is slightly reduced despite enormous space availability. It is also well established that the intermolecular interactions in solids, as shown in **Figure 5**, is such that it is possible to ensure atoms the freedom of movement required by random oscillation. From this picture it is perceived that there is a distance between molecules r_0 where the attractive and

repulsive forces are neutralized. This distance is the distance between the particles equilibrium. If the distance between atoms becomes smaller than r_0, then the force begins to be *repulsive* and is growing very rapidly. Conversely, if the distance becomes bigger than r_0 then *diatomic forces* are attractive and prevent atoms to move away from each other. These forces, the measure of which is proportional to the coherence of molecules in the body, do not allow random motions without the risk of collapse of the crystal lattice of the solid.

Existing theory does not explain the way the *fields* move so as to force the atoms and molecules in disordered and chaotic motion. In contrast, according to the proposed theory, the fields and the associated attractive- repulsive diatomic atomic forces developed, as those shown in **Figure 5**, are perfectly compatible with a *resonant (synchronized) oscillation*.

On top of that, existing theory addresses the thermal expansion in accordance with the linear law (see e.g. the standard Young's physics book [18]):

$$\Delta L = \alpha L_0 \Delta T \tag{3a}$$

where α is a constant (coefficient of linear expansion) depending on the type of material. If the length of a body at a temperature T_0 is L_0, then at temperature $T = T_0 + \Delta T$ the length L becomes

$$L = L_0 + \Delta L = L_0 (1 + \alpha \ \Delta T) \tag{3b}$$

Qualitatively, thermal expansion is interpreted based on diatomic forces, which in a solid are considered as 'originating' from springs (**Fig. 6**). Every atom oscillates around its equilibrium position. As the temperature increases, both the amplitude and the corresponding energy of oscillation increase.

According to Young [18,p.577], "We can understand thermal expansion qualitatively on a molecular basis. Picture the interatomic forces in a solid as springs, as in **Fig. 6**, …. Each atom vibrates about its equilibrium position. When the temperature increases, the energy and amplitude of the vibration also increase. The interatomic spring forces *are not symmetrical* about the equilibrium position; they usually behave like a spring that is easier to stretch than to compress. As a result, when the amplitude of vibration increases, the average distance between atoms also increases. As the atoms get farther apart, every dimension increases". Also, "… the direct proportionality expressed by Eq. (3b) is *not exact*; it is approximately correct only for sufficient small temperature changes. For a given material, α varies somewhat with the initial temperature T_0 and the size of the temperature interval".

The above explanation of thermal expansion has three weaknesses:

i) **Figure 6**, which depicts the intra-atomic forces in a solid as 'produced' by the springs, is not convincing that atoms have the freedom to move with disorderly and chaotic oscillations.

ii) While admitting that Eq.(3b) is not accurate, and that is only approximately correct for a number of small temperature changes, it does not explain the reasons why. However, in the context of the proposed theory heat is nothing more than enrichment of the body with new thermions. It is important to note that the electrical charges remain constant during heating. The visible result is the expansion of the body. Expansion means however that in heating the repulsive component of (attractive-repulsive) cohesion forces increased more than the attractive one. The explanation is clearly shown in **Figure 7**. The increase in thermions in the body by heating, implies a linear increase in attractive forces

electrothermal forces ($F_2 = k_2 q\theta/r^2$) and a much larger increase in repulsive thermal forces ($F_3 = k_3\theta^2/r^2$). This is because by heating the electric charges q remain constant, and the attractive force $\mathbf{F_2}$ varies according to the θ while the repulsive $\mathbf{F_3}$ changes much faster versus θ^2. That is why the expansion of bodies, according to the proposed theory, is *not generally linear*, a fact which is understood in case of large differences in temperature.

iii) The explanation given that intra-atomic force and the corresponding potential energy *are not symmetrical with respect to the equilibrium position*, and that they behave as if they come from '*defective*' springs that are more easily stretched than compressed, in our view cannot stand to criticism. The explanation we give ourselves for the *asymmetric vibration* of the molecules of a solid body during heating such as heat transfer 'by conduction' is that heating induces an energy anomaly that has then to be decayed. In order to increase our natural intuition, we preface a very enlightening and very useful macroscopic mechanical analogue, for later needs.

Consider a spring of length 20 cm in the middle of which (for monitoring the process) we clinch an indicator, which divides the spring in two ideally equal parts each of length 10 cm, as shown in **Figure 8a**.

(a) We stabilize the indicator to point M (middle of AB) and the right end B at the positions shown in **Fig.8a**.

(b) Then we apply a force F on the left end A and compress the spring at a final length equal to 60% of its initial length (compression: $\Delta x = 4$ cm). In the sequence we fix the displaced end at A1, so the final length of the spring becomes now 16 cm as shown in **Fig.8b**. At the latter state, the left part of the spring has stored elastic (potential) energy $E_p = 1/2\times k\times\Delta x^2$, where k is the stiffness of the spring in (N/cm). In this way, we have created an energy anomaly (disturbance), as the potential energy of the left half is greater than that of the right half (the latter equals to zero, i.e. uncompressed); this situation is very similar to some condensing and thinning occurring in the propagation of *longitudinal waves*. Note that the thermal analogue would be the heat supply in a specific area of the body.

(c) Having the point A1 always fixed, we release the indicator and allow the spring to oscillate until equilibrium. Initially the potential energy turns into kinetic (the left part starts moving to the right), while the right part shortens and transforms the kinetic energy into potential one. Due to the spring inertia the indicator obtains its maximum velocity at the equalization of the length of two segments (8cm on the left of the indicator and 8 cm on the right) and its motion will continue until its velocity vanishes. In case of an ideal spring with no damping, the extreme right position of the indicator corresponds to 4 cm right to its initial position M (i.e. 6 cm from B and 10 cm from A1). However, due to many physical reasons (friction, elastoplasticity, air resistance, radiation et cetera), at the end of the first half cycle the indicator will move to the right something less than 4 cm, say 3.9 cm, thus changing the compression of the right part from 6 cm (ideal spring) to 6.1 cm. As a result of a smaller moving elastic force, at the end of the second half cycle the new amplitude will not be 3.9 cm but something less, say 3.7 cm. Therefore, at the end of the first cycle the right half spring will obtain a length equal to 6.3 cm (instead of its initial compression of 6 cm). In other words, it will have lost $E_p = 1/2\times k\times 0.3^2$ of its initial potential energy. In the second cycle, for the same reasons the right half spring not to have the aforementioned length of 6.3 cm but something more, say 6.5 cm, as shown in **Fig.8c**.

(d) The abovementioned way of decaying motion is repeated so as after a certain number of oscillations the amplitude will approach 2 cm and the moving force will be minimal, and will vanish when both halves of the whole spring become exactly equal to 8 cm, where the motion ceases (point M2, **Fig.8d**).

Another important observation concerns the adjustment of many indicators to all the spring's coils, and the repeat of the experiment; then we see that all indicators are starting to vibrate *almost simultaneously with the same frequency but different amplitudes of oscillation*, until the balance in their new locations which are for all indicators shifted to right, with a decaying shift from the middle to both ends. The slight delay in the starting time instances of oscillation between the first and last indicator depends on the mechanical characteristics of the propagating medium, i.e. is strongly related to the ratio of the *elastic modulus* over the *mass density per unit length*. This means that throughout the whole spring vibrates in the aforementioned *particular* asymmetric swing in order to achieve *dynamic balance*.

By the same asymmetric oscillation move also the Max Planck's quanta of light and heat, to remove the heat sources like the sun, which cause energy anomalies (disturbances).

The proposed theory suggests that this unique vibrational motion is '*conditio sine qua non*' to achieve the smoothing in existing energy imbalances within systems of any kind, under *stress* (generalized "force") and hence no need for innumerable collisions between molecules to achieve equilibrium, as the existing theory asserts. *This particular oscillation is a law of nature*. In accordance to the aforementioned asymmetric oscillation is the motion of the entire energy grid of thermions under "stress", of the entire universe (**Fig. 2**), in order the remove the produced quantized heat (thermions) to the stars. Using this oscillation, and because of their interaction with the electric quanta which are the building blocks of matter [Eq.(2b)], the thermions cause a similar oscillation.

In more details, **Figure 9** shows the combination of thermions with the dipoles (the building blocks of matter) to understand the interaction of thermions with the quanta of electric energy. As long as the thermions, in order to normalize an energy anomaly such as the sun, removed with the same asymmetric oscillation of the spring due to the interaction with the building blocks of matter, they will propagate the asymmetric vibration of the constituents of matter. Therefore, the kinetic energy of atoms and molecules of material bodies (which coincides with the thermal energy of the existing theory), is a secondary process, as we claim in the proposed theory.

After this systematic study of various thermal phenomena, we effortlessly concluded that there is a 'relationship' between the proposed –as an independent and autonomous form of energy–, and the existing theory –as a total kinetic energy of molecules. However, this relationship is a *causality relationship*, *action and reaction*. As is known, the *cause always precedes the effect*, in other words 'action precedes reaction'.

Of course, the measurement of the reaction (*kinetic energy*) gives us a measure of the action from the view that Action equals Reaction. *But in any event*, action and reaction is not the same thing. Similarly, the kinetic energy should *never be emulated with thermal energy*. This seemingly small difference, allows the existing theory to explain (with the aforementioned weaknesses and ambiguities), somehow the various thermal phenomena, but is not able to explain the detailed mechanism, which is an obstacle to our being able to correctly understand the natural processes and to draw useful conclusions from them as will be shown below.

For argument's sake, say that the Copernican revolution could be said, considering the surface issue, which concerned only whether the Sun revolves around Earth or vice versa. The deeper meaning was, however, *whether theoretical mathematical models describe correctly the physical reality*. The motion of the planets we can predict, with considerable accuracy, either to the geocentric system of Ptolemy or even to the heliocentric Copernican; not only that but in some cases the use of the geocentric is probably easier because it puts the origin of the coordinates system at the point where observation is taken place. However, the Copernican revolution is because we choose to impose the system of Copernicus, since *this is the true picture of physical reality*. So relying on right background, Kepler was able to demonstrate that the precise orbits of the planets are *eclipses*, and then Newton was able to explain the elliptical orbits, to create the theory of how celestial bodies move in space and eventually make the law of the *global gravitational attraction*.

In a similar way, relying on the correct (in our belief) proposed background concerning of the nature of heat, then we prove that the energy grid of thermions under stress, on one hand *is able to give us insulated circular transverse waves*, and on the other hand has the required *stress and mass* to be able to give us disturbances to propagate at a speed of 300.000 km / s, thus has all those characteristics required, from a gaseous fluid to provide a means of spreading light transmission, i.e. the aether. This aether, which unlike other types of aether occasionally suggested [26,27], we have baptized *Θερμοαιθέρας* (Thermo-aether) so as to indicate its origin; it will be presented in detail in Part II of this study.

Also using the abovementioned asymmetric oscillation we can give simple, convincing and totally understandable answers to wave-particle dualism and why the particle nature of light occurs only upon the emission and absorption of light radiation, and can explain the two-slit phenomenon as well as a multitude of luminous phenomena.

The simplicity and realism of responses to a variety of issues such as this, makes us optimistic to believe that the proposed theory, if anything, is in the right direction.

Unlike all the weaknesses of the standard model expounded, in favor of the proposed theory, which claims that the thermal energy is an independent and autonomous form of quantized energy of which field is based on the subatomic particle “thermion”, a variety of macroscopic phenomena lead us firmly in our view. Most of these phenomena have resulted in what we now characterize as a *deficit of mass*, as mentioned above.

One of the most characteristic macroscopic phenomena to be invoked to support our view that, in general Nuclear Fusion is taking place in all the stars and with which, as known, huge amounts of heat is produced. Fusion is the process by which light nuclei are continuously synthesized into heavier nuclei by a simultaneous release of thermal energy. In fusion reactions taking place today in our Sun, mainly a nucleus of helium (He) is produced from four hydrogen nuclei (protons) according to the following scheme:

$$\mathbf{p + p \rightarrow {}^{2}_{1}H + e^{+} + \nu + 0.42\ MeV} \quad (4a)$$

$$\mathbf{p + {}^{2}_{1}H \rightarrow {}^{3}_{2}He + \gamma + 5.49\ MeV} \quad (4b)$$

$$\mathbf{{}^{3}_{2}He + {}^{3}_{2}He \rightarrow {}^{4}_{2}He + p + p + 12.86\ MeV} \quad (4c)$$

Transformation of four hydrogen nuclei into helium (He) emits a total energy of 26.73 MeV in the form of heat. If we denote the mass of the nucleus of hydrogen by m_p (proton mass) the mass of He is not -as one would expect- equal to four proton masses, but 3.97

m_p. We say that the fusion created a *deficit of 0.03 mass* of the proton mass, which for each molecule of helium formed, gives energy $E = mc^2 = 0.03\ m_pc^2$, according to Einstein's theory, in the form of heat.

To enable our own Sun to maintain its brilliance, cosmologists have estimated that in each second it has to convert 4 million tons of its mass into *heat energy* and radiates the energy released in the form of *heat* to the environment. According to the current standard model, the thermal energy is the total kinetic energy of atoms and molecules ($1/2mv^2$). Neither it is clear the thermal energy released by the Sun in what kind of mass manifests itself as kinetic energy, nor how the observed mass deficit is explained by the simultaneous heat.

In contrast, the above questions are fully explained by the proposed model in a simple way, assuming (i) that heat is independent quantized energy coming from Eq. (1), i.e. $q^+ + q^- \rightleftarrows 2k\theta$*, with degradation of high-level electrical energy in lower-level quantized thermal, (ii) that the removal of produced thermions into the surrounding space is because of the repulsive forces exerted between thermions [Eq(2c)], and (iii) as well as the law of force superposition and the asymmetric oscillation due to the generated energy anomaly.*

Today we know that what we call matter is actually *condensed energy* and that the nuclei and electrons making up the material bodies are composed of positive and negative electric energy (electrons, protons and neutrons), and even the electrons and protons are found in equal quantities to the material bodies to appear electrically neutral.

We argue that, in addition to positive and negative electric energy, material bodies must be composed of *quantized thermal energy*. We support our claim as follows:

We all know that in chemical reactions, when the reaction products are of a lower energy level than the reactants, we have heat dissipation. Unlike when we want to manufacture a chemical compound of which the energy level is higher than that of its components, we must provide heat to enable it to carry out the reaction. We know that what actually happens when chemical reactions are nothing more than a simple *rearrangement* of atoms and their *reconstruction* into *new molecules*. But in any reconstruction of material rearrangement, it is material that is *systematically* either *missing or in excess* can be anything from one of the *primary key ingredients*. So the heat that systematically is *missing or in excess* of any chemical reaction has to be *one of the key components of the material body* (the second after the electric power). The form thus of the thermal energy as a component of the matter can not be in the form of kinetic energy, which *implies* the existence of mass. *The components of the mass come before the mass*. Moreover something must be located between the opposite electric charges to act as an insulating medium, a role that can be played by thermions (*ουδετερόνια)*, as we explain below in **Section 7**.

At this point we should clarify that all other known types of energy are "*inherent properties*" of material bodies since their existence *implies the existence of matter*.

- ***Nuclear energy*** owes its existence to the 'structure' of the nucleus, i.e. how the *building materials (namely protons and neutrons) are distributed to the nucleus space*. So nuclear power requires a nucleus that is the existence of matter. Without the existence of matter there is no nuclear energy.
- ***Chemical energy*** is similar, except that it is due to the way in which the atoms of the chemical compound are distributed *in the space of the molecule*. '*Conditio sine qua non'* is again the existence of the matter.

- ***Potential energy*** has to do with the relative position of a quantity of material to the position of another quantity of material. '*Conditio sine qua non'* is again the existence of the matter.
- ***Gravitational energy*** (in accordance with existing theory) is developed by the interaction of material bodies.
- ***Kinetic energy*** is due to the kinetic state of a material body.

We see that all forms of energy are properties that imply the existence of matter (in the usual sense). *It cannot thus be simultaneously a constituent of matter as well*. The components, as mentioned above, are prior to matter and matter is ahead of the acquired forms of energy. Because we firmly believe that nature operates by simple laws we conclude that the matter, which anyway is condensed energy, *should consist only of electric and thermal energy*.

There are numerous examples in which there is a deficit of mass which we can explain very simply, on the basis of the conversion of concentrated high-level to lower-level electrical to thermal energy by Eq.(1), which could be invoked.

- We mention here briefly the annihilation of matter with antimatter, such as are the electron and positron, which in contact with low energy annihilate (mass deficit) giving energy in the form of mainly two *gamma rays*.
- The gamma rays are the result of very high temperatures developed by the reaction of opposite electrical charges and the effort to eradicate the generated energy anomaly.
- Annihilation of electron and positron and the deficit of mass, will be better understood in the framework of the proposed theory after quoting some earlier evidence of the creation of the universe (Sections 5 and 6), and the Structure of Matter (Section 7), just below.

5. A peculiar singular "Nothing"

It is well known that the universe is *everything*, so excluded something is outside of it. The universe is a *closed system*. The description of any entity in the universe must necessarily refer only to other entities within it and the relationship between two successive events is *causality*.

With the currently accepted view, we accept that, before Creation there was *absolutely nothing*. At that time a dead calm prevailed, a deep darkness, there was limited and there is nothing absolute uniformity. Inevitably, therefore we must give an answer to the question: how did the universe with trillions of trillions of stars and planets was produced from nothing? To do this perceived we need to define what we mean when we say 'nothing'.

Today there is broadly the idea of matching the concepts of 'zero' and 'nothing'. The nature of the zero is a complicated concept, contrary to the essence of human thought. This is not unrelated to the effort made by the mankind to assimilate and reconcile with the concept of 'zero' a number that was accepted as a mathematical entity, just 400 years ago. But between 'zero' and 'nothing' there is a difference. While the concept of 'nothing' is intertwined with the utter lack of any tangible or intangible entity, not the case with 'zero'. The zero has built-in the capacity to exist as a superposition of two opposing vector magnitudes such as two forces, or even two equal and opposite dimensionless numbers.

In physics as we know, there is a very important principle, called principle of *superposition* of forces. According to this principle, the result of two (or more) forces acting at the same point a body is the same as the result of a single force that is equal to the vector sum of forces et cetera. If so we have two equal and opposite forces to overlay the effect of these forces will be zero. If, for example, we have a plumb line and hang from a fixed point, the resultant force between the tensional force of the string and the pull of gravity is zero. The result is that we have no change in the kinetic state of the system, so what we see macroscopically is the absolute serenity, with plumb bob to balance upright. The result was zero, but it does not mean that the two forces are no longer present. The presence of the forces will be readily understood by a disturbance in the system, as manifested by a decaying oscillation of weights.

So during a perturbation on a system in equilibrium state under the influence of some superposed forces, it is possible to have the appearance of action of these forces.

In the above example, we showed that in nature the *zero* has another meaning than that which we give the dimensionless numbers in mathematics. When we have physical bodies with dimensional numbers, such as electric charge, the form of zero as a superposition of forces is *prevalent.*

Here we should mention that while all equal and opposite lead to zero, the opposite to which we refer, of course, must not be contrary complexities.

To enable these contradictions *spring from nothing with the greatest ease, should they have the ultimate possible simplicity*. This perfectly simple, the simplest possible, cannot be anything other than some dimensional opposite unit entities. The quanta of electricity satisfy this constraint.

Therefore the assumption that the first subatomic particles that appeared in the Universe must have been the unit positive and negative quanta of electricity, (q^+, q^-), which we assume that resulted from a *random disorder* in an unstable equilibrium. The superposition of vector quantities, which marked both the beginning of Creation and the beginning of time, *have serious grounds* to correspond to reality.

We say that, as the positive and negative unit gives us a zero sum, in the same way 'zero' or 'nothing', under certain conditions (superposition of vector sizes and some random variation) must be able to break and give us *an unlimited large number of 'pairs'* of positive and negative units with a *total sum equal to zero*. That is exactly zero, whatever we characterize as a peculiar singular *NOTHING* *.

According to quantum mechanics, even what we characterize as 'empty space' that is also synonymous with 'nothing', is filled with pairs of *'potentially' particles and antiparticles*, having zero-sum of energy. These pairs may have an *infinite* amount equal and opposite (positive and negative) energy and thus have an infinite amount of equivalent mass. It is what some scientists now call *quantum fluctuations of vacuum*.

Today is a routine for nuclear physicists to create matter and antimatter from nothing. The offensive in this case is that in order to continue to apply the law of energy conservation, *the universe must be moving, steadily and firmly, to zero, the peculiar nothing*, from which we assume to have originated. A schematic representation is given below:

NOTHING * <=> Universe <=> NOTHING *

The electric charges generated by the random disorder, the unstable peculiar *NOTHING* * are distributed in an extended region of space with a symmetric manner as shown in a profile in **Fig.10**.

Our abovementioned claim is in contrast to the standard model of Big Bang, which provided (at least initially) that the universe originated from a *zero-space of infinite temperature and infinite density* to unacceptable infinities temperature and density and misuse of the concept of the explosion, which is defined as a force '*from the inside out*', features not available to the point area.

With this symmetrical distribution, the created primordial 'Universe' has the *minimum possible entropy* (maximum rank) that ever had the universe at any other stage of evolution, a fact which is in harmony with the evolution of universe entropy.

Since the universe is a closed system and nothing can be created with materials outside, means that 'the invitation which was immediately after this phase of Creation, we are all here present'. Once the quanta of electricity sparked by the 'zero' because of the embedded properties, dissimilar quanta begin to attract and interact with great intensity according to Eq.(1) thus causing a massive *electrical discharge*, while producing huge quantities of thermions (ουδετερόνια), raising the temperature in a billion of billions degrees. With this procedure, a small percentage of the electrical charges created initially, *insulated* from the huge amount of thermions, will not be able to react with each other and will survive this carnage. The fact that the production of thermions in the early stages of reaction [cf. Eq(1)] was explosive implies on one hand an abrupt temperature increase of the universe (due to very high density in this phase the thermions have), and on the other hand its breakneck expansion (because of enormous repulsive forces exerted between the thermions at this density). In this analysis we give a direct answer to the *unanswered questions* formulated by Stephen Hawking [10], with respect to the inability of existing theory. A direct result of the aforementioned reaction was to destroy a large percentage of high-level energy, as schematically is illustrated in **Figure 11**.

From general physical chemistry we know that all the exothermic chemical reactions, but generally all spontaneous physical changes, as is Eq.(1), have an inherent tendency to want to reach a state of maximum stability which is the *equilibrium*. A system that is not at equilibrium, therefore, has a tendency to reach there, and the trend is the greater, the greater is the system away from the state of equilibrium. The speed with which those changes take place depends on the *concentration* of reactive components.

The path to equilibrium does not necessarily mean the completion of the reaction. On the contrary, most reactions seem to 'stop' while there are still unchanged reactive substances, since the *dilution* that occurs during the course of the reaction becomes prohibitive to continue.

Concentration of q^+, q^- of Eq. (1) under study, at the initiation time is 100%. Thus, the initial reaction rate is too high; it is *explosive* declining down over time due to the reduction of the concentration of reactive components, an output of thermions, as shown in **Figure 12**.

So the *first Big Bang ever happened*, should in our view, be a '*Great Electric Discharge*'. Besides, because of electrothermal forces [Eq(2b)] thermions stick on to the remaining

electric charges and shield from complete self-destruction, forming the *positive and negative monopoles* (**Figure 13a**). Schematically we have incorporated 6 thermions to each monopole, the one on the better visualization of the shapes and secondly, to simplify calculations we will perform then. Actually **Figure 13** shows the *fields* of pure energy of q^+, q^- and θ.

The monopoles are therefore the first energy *agglomerates* formed in the early Universe. It is what the existing cosmology characterizes under the vague term *primordial particles*.

Here we should note a crucial fact, *the welfare of nature* to ensure intact the maximum possible rate of electrical charges from their self-destruct, Eq.(1), first by their *insulation and shielding* using the resulting thermions and second by forming agglomerates which *still have the ability to attract one another*, to give them time so as to coagulate still more; we will explain it immediately below.

This 'battle' between the scattering of high-level electrical energy from one and the rallying of the other, will be met throughout the first phase of universe evolution; particularly the phase of its expansion *as the main cause of all further developments.*

As long as the reaction between the electrical charges is interrupted and the formation of new thermions has *stopped*, the continued expansion of the universe implies the *cooling*, i.e. the dilution of the thermions energy grid. In fact during this phase and *only in it*, when doubling the volume of the universe, the temperature drops to half.

When diluting thermions by the expansion and cooling of the universe is well advanced, the attractive electric forces between oppositely charged monopoles, outweigh the superimposed repulsive forces between the free thermions and the opposite monopoles begin to approach and join together to form the *neutral electric dipoles* shown in **Fig. 13b**.

We observe that these energy agglomerates, which are the *basic building blocks of creation of matter*, are (as we have previously supported) composed *exclusively of quanta of electric and thermal energy*. As expansion and cooling of the universe goes on, the possibility of uniting the already coagulated energy follows. The attractive electric forces *orient* the dipoles in such a way that the attractive forces to prevail over the repulsive ones and begin to merge together to give us patterns of two- and then three-dimensions as shown in **Fig.13c** and **Fig.13d**, respectively.

As we will explain later in detail, from these patterns, the neutrons, and then protons together with electrons and positrons, will be created. That is, all those particles of which -as we know- all the huge variety of material bodies around us is made will be formed.

6. Lines of resistance of the universe from its self-destruction

6.1 First line of resistance: Crystallization

Along with the expansion of the universe, *further packing* of energy continues in a manner similar to a perfect crystal that is created by 'infinite' repetition in the space of identical structural units (for an analogy the reader can think of the *unit cells* in canvass or textile fabrics) and at the same time the *further cooling of universe* ends, as we will explain. As we know, when a crystal grows in a stable environment, its shape remains unchanged during development, as if identical building blocks are added to it. The structure of all crystals is described as a function of a grid in each reticular point is a

group of atoms. The group is called *base* which has the same composition, arrangement and orientation throughout the crystal.

In the sequence, our effort is now found to prove that the base of each point of the reticular aggregate created is the dipole, and the crystal is the neutron. This means that this entire agglomerated energy formed a *neutron star*. The fact that the total electric charge of the universe is zero is a good starting point in our effort.

The process of *crystallization* of these energy agglomerates (clusters) is crucial and is the '*first line of resistance'* that has provided the nature itself, against its self-destruct of the quanta of electricity through its dispersal and degradation. By doing this will enable the further evolution of the universe in its present form, as we will describe below. We note that the process of bringing the initial energy clusters to larger patterns is *entirely consistent* with the expansion and cooling of the universe.

As shown diagrammatically in **Fig.13a**, at the creation of the dipole we have the first lowering by one thermion per pair of electric charge. In the dipole there are graphically eleven thermions per pair of electrical charge, compared to twelve that the two monopoles had before the assembly, and the ratio $\lambda = q{:}\theta$ from 1:12 becomes 1:11, with q denoting the number of pairs of electric charges and θ the number of thermions. The decreasing rate of thermions in the dipole is perfectly compatible with that of the surrounding environment. We also note that the twelve thermions of two monopoles that will form the dipole are external and is easy to escape to the surroundings when the dilution (due to expansion of the universe) allows it, while from the eleven thermions of the dipole only one is internal so as it is very difficult to escape into the environment.

From **Figure 13c** we see that the arrangement is composed of twenty thermions and two pairs of electric charges. Therefore, the ratio of pairs of electrical charges to thermions has now become $\lambda = q{:}\theta$ = 1:10, which is poorer in four thermions from 4 × 6 = 24 initial (original) monopoles, which created it. Out of the 20 thermions of this arrangement only 4 of them are internal.

Continuing we see that in the simple three-dimensional arrangement of **Fig.13d** there are 4 pairs of electric charge and 36 thermions so we have $\lambda = q{:}\theta$ = 1: 9, of which 8 are internal. In formations with three electrical charges along each edge (as we shall see below) and considering the cubic system of crystallization, we find that there are 27 electric charges and 108 thermions, that is we have $\lambda = q{:}\theta$ = 1: 8.

If we move in formations with 4, 5, ... , 100 ..., electric charges along each edge of the cube we create **Table 1**.

We observe that by increasing the size of the energy clusters we have a constant *reduction in the ratio* λ, which has the limit $\boldsymbol{\lambda}$ **= 1: 6** (last two columns in Table 1).

This means that *with the gradual increase in the size of the energy clusters, thermions 'escape' from them, come and feed the continually expanding surroundings in order to equalize the temperature of clusters with that of the surrounding area*.

With the decrease in λ (coefficient of coherence) the composition of aggregates is changing, thus changing and attractive-repulsive forces developed between the particles of which they are composed. The result of this reduction is, as explained above, the increase in attractive forces and agglomerates to be more cohesive.

By completing the aggregation of all original monopoles in a single set, eventually half of the initial bound thermions have saved (the ratio λ from 1 : 12 to monopoles changed to 1:

6 in the final agglomerate), *so as it was not necessary to sacrifice not even one of the electric charges that remained from the first catastrophic reaction*.

However, with the continued cooling of the agglomerates a contraction of volume occurs. Thus we have the phenomenon of *the universe as a whole to expand and the agglomerated energy to contract*. In this way we get a superheated gaseous sphere surrounded by a second sphere, which consists of a lattice of tension-free thermions the outer surface of which marks the limits of the universe, a finding that is not determined by the existing cosmology.

The superheated internal ball has begun to radiate. It is reminded that radiation was discovered in the mid 60's by Penzias and Wilson [19] and they called "*cosmic background radiation*".

This extended and electrically neutral crystal, which was formed by the combination of all the dipoles that were created after the initial electric discharge, has all the characteristics of those elements to qualify as a neutron star, as we will show immediately thereafter.

6.2 The remaining lines of resistance

Before proceeding, however, other lines of resistance of the Creation of the Universe (phase change, decay, and fusion), which is detailed in Part II [29], we will make a parenthesis to examine the *structure of matter* in the subsequent Section 7.

7. The Structure of Matter

7.1 The electron and positron

By creating extensive but neutral clusters, the *basic requirement* of the agglomerates to have the ability to attract each other in order to be clustered into larger aggregates, would progressively be difficult and more difficult. What is crucial in crystalline bodies is the *number of electrical charges in each of the edges of the crystal*. When a crystal crystallized in the cubic system, consists of an odd number ($2n$ +1) of electric charges, 3,5,7 et cetera, then all the electrical charges of the crystal, being equal to the third power of this number, is also an odd number. For example, in case of three electrical charges on edge, all the charges to the crystal will be $3\times3\times3 = 3^3 = 27$. As a result, the number of positive and negative electrical charges in such crystals *is not equal to each other*. One of the two types will have an additional charge, which will *determine the charge of the entire crystal*.

As such, seems the nature to know, so the next step, after the aggregate of form shown in **Fig.13d**, sought to create agglomerates with an odd number ($2n$ +1) of electrical charges at each edge of the crystal, which, as now seems likely, given them a relative autonomy, such that they are found intact even today.

To simplify our calculations and still the shapes are most 'visible and legible', for basic cubic crystals with an odd number of electrical charges on the edge, we use (on the simplest) crystal owing three electrical charges. This does not fundamentally change the philosophy of the proposed theory. Also for the same reason, in the sketches of the electron and the positron (**Figure 14**), we replaced the internal thermions with purple lines while we omitted the external ones (in fact they obviously exist).

Another important observation is that if the electric charges located in the *eight (8) vertices* of the cube are negative (**Fig.14a**, red) then out of the 27 existing electrical charges only 14 are negative versus 13 positive, so the crystal exhibits *negative* charged. If, however, at the 8 corners positive charges are found (**Fig.14b**) then the 14 are positive and 13 are negative, so the crystal will be *positively* charged. In this way the Nature foresight to make it easier to attract the oppositely charged clusters and allow for further aggregation.

Conclusion: If a particle with any odd number ($2n$ +1) of electrical charges along its edge, with negative electric charges at its eight vertices (therefore *negatively charged*) is baptized as an '*Electron*', then the corresponding particle with positive electrical charges on its eight vertices which are positively charged, it should automatically named '*Positron*'. And it is because the positron has the *same size and same weight.* Still, because of the symmetry that exists in electron, this means that the latter is its *antiparticle*.

By this definition we gave for the electron, we can directly explain the hitherto unanswered question: '*why the electron with the negative charge dispersed on the surface, is not degraded by the repulsive Coulomb forces exerted by the aforementioned electrical charge is on the electron*?' Here the answer is obvious, simply because the electric charge is not 'distributed' to the surface of the electron but it is symmetrically 'distributed' throughout the mass of the electron, as shown in **Fig.14a**. So we proved in a simple and understandable way that the two basic particles of matter, the electron and its antiparticle the positron, have no problem to consist solely of the quanta of electricity (θετικόνια: q^+ and αρνητικόνια: q^-) insulated by thermions (quanta of thermal energy).

7.2 The Neutron

In contrast to the electron, if a crystalline particle crystallized in the cubic system has along each edge an even number ($2n$) of electric charges, 4,6,8 ... 100 ... etc, then the sum of all the electrical charges of the crystal is also an even number; the negative electric charges are exactly equal to the positive ones and the particle appears electrically neutral. For example, considering six (6) electrical charges in each edge the total quanta of electric charge will be $6^3 = 216$, of which 108 are positive and the remaining 108 are negative and the particle electrically neutral.

If we now create a crystal with $2 \times 3 = 6$ electric charges along each edge, **Figure 15** (i.e. the sum of electrical charges we assumed that the electron and positron have) the crystal is in accordance with what we set out to be electrically neutral. This same crystal can be regarded as consisting of eight (8) smaller cubic crystals with three (3) electric charges each of them.

It is worth-mentioning that if we focus in the arrangement of these electrical charges in one of the faces of the cube, we will see something like that shown in **Fig.16**. From this figure we see that the first block (shaded in **Fig.15**) with the surface ABEZ having negative charges at vertices (black spheres in Fig.16) is the familiar electron while the next cube ΒΓΔΕ has vertices with positive charges (white spheres in Fig.16) is the familiar positron.

In this analysis we did, we see that as the q^+ and q^- quanta of electric charge can coexist harmoniously in the dipole insulated by thermions, *exactly the same way electrons with positrons can coexist* insulated by thermions as well. In addition, essentially by

combining the electron with the positron they create a sequence of dipoles, as can be seen in **Fig.16**.

The proof we asked for the correctness of these considerations initiated from a valid and unequivocally way, in the form of an image due to the textbook of Frank Shu [20,p.104], illustrated in **Figure 17**.

There, among other things, the following is listed: "The nuclei of ordinary atoms are made of protons and neutrons. The proton and neutron are the simplest and most important examples of a class of particles called *baryons* (the word "baryon" derives from Greek, meaning the "heavy one"). Murray Gell-Mann [21] and George Zweig [22] proposed in 1963 that the proton and neutron *were not truly elementary particles*, but were made of three *quarks*. At the time of their proposal, it had long been known that the proton and neutron acted as if they had finite size (about 10^{-13} cm), but only in the 1970s *did high- energy scattering experiments provide indisputable evidence that the proton and neutron were made of small hard subunits* (**Figure 17**) …)".

In fact, **Figure 17** shows the trajectories of fragments from bubbles that were remained as charged particles passed through a chamber of superheated hydrogen. What is particularly interesting for us is that as we see in the picture, among the crash debris there are enough *positrons and electrons* as well as various muons and hadrons which positively and negatively charged are separated by the help of magnetic field. (Note: within the fragments there is no *Quark*).

Now the question arises: what is likely, the positrons and electrons in which the nucleus decays have been created in the collision of the neutrino with the nucleus, or *to coexist in the core (as we show in Figure 16) and were separated during the collision*? Common sense dictates us to accept that the most likely is to exist inside the nucleus before the collision, just as we supported.

But the standard theory, even today supports rather arbitrarily, at least without giving a convincing explanation, that electrons and positrons were created *by the energy* the particles had on collision (impact). The fast-moving particles stopped abruptly and the kinetic energy given to them is released in the form of a rain of new particles. These particles are not in any sense, particles that are "inside" the original ones and are shaken out of the collision [23]. Obviously, we do not agree with this view.

In our effort to reform the neutron, the only factor we borrow from nuclear physics is that the mass of the electron is equal to 9.1094×10^{-31} kg or 0.51099 MeV/c^2 and that the mass of the neutron 1.67492×10^{-27} kg, or 939.51 MeV/c^2, which means that the neutron is 1836 times heavier than the electron.

Of the currently outlined what is sure to create the electrically neutral neutrons, is that electrical charges along an edge of the neutron should be even number. Besides the fact that the neutron is 1836 times heavier than the electron leads to the conclusion that the electrical charges on the edge of the neutron will be 12 times the electron charge, which is the nearest cube root of 1836. Suppose then that the electron has three electrical charges arranged as shown in **Fig.14a**. With three electric charges on the electron along the edge of the neutron should be *6 edges of electron and 6 electron sides of positron* with a total of $3 \times 12 = 36$ alternating positive and negative electric charges as shown in **Fig. 18**.

The total number of electrons and positrons in this crystal with an edge of size 12 is therefore $12^3 = 1728$, of which $1728 / 2 = 864$ are electrons and another 864 are positrons. However, the number is less than the equivalent weight of the neutron in 1836 - 1728 = 108 electron weights.

But other than electrons and positrons to build the neutron *we need additionally a number of internal thermions* that will insulate the opposite surfaces of these particles (Fig.16). So, as long as the neutron we construct has 1728 building particles, electrons and positrons, the surfaces to be "insulated" are 1728 × 6 - 144 × 6 = 9504 (the 144 × 6 = 864 are the external surfaces that will be insulated with 9 thermions, i.e. 864 × 9 = 7776). And because the insulation needs two surfaces, there will be 9504 / 2 = 4752 pairs of surfaces.

If each pair of surfaces we need to insulate 18 thermions, thus required totally 4752 × 18 = 85,536 thermions. If therefore the equivalent mass of these 85,536+7,776 = 93,312 thermions equals the mass of the 108 (=54 + 54) remaining electrons and positrons, then the constructed neutron possesses an equal mass of 1.67492×10^{-27} kg, which is the mass of *natural neutron*. In this way we achieved to build up the neutron without the involvement of silent today quarks, nor with the *fractional electric charge* for which there is not even the slightest evidence of being in the entire universe.

If this is the case, with these data we can now move forward to make a first calculation of equivalent mass of a thermion. As long as the 93,312 thermions have an equivalent mass of 108 electrons, this implies that the mass of 93,312 thermions will be equal to 108 × 9.1094 $x10^{-31}$ kg or 983.815×10^{-31} kg, and therefore 983.815×10^{-31} kg / 93312.

Therefore:

Equivalent Mass of a Thermion: $\theta = 1.05433 \times 10^{-33}$ kg (5)

In other words, a thermion is 93312 / 108 = 864 times lighter than the electron (always provided that the electron has three electrical charges at each edge).

Moreover, we can also calculate the weight of the quantum of electricity. From **Fig.14** we observe that the electron consists of 27 quanta of electric charge and 108 thermions (see also Table 1, third row - fourth column). We have previously found that the equivalent mass of the electron is equal to 864 thermions. Therefore, 864 = 27q +108, whence 27q = 756, which implies q = 756/27. Therefore:

Equivalent mass of electric quantum: $q = 28 \times 1.105433\ x10^{-33} = 2.952124 \times 10^{-32}$ kg (6)

where

q is the mass of the pair of electric quantum, the latter consisting of one positive and one negative quantum (i.e., $q = q^+ + q^-$). Therefore:

$$q^+ = q^- = q/2 = 1.476062 \times 10^{-32} \text{ kg} \quad (7)$$

Considering Eq(2c), we estimate the value of the constant, k, equal to

$$k \cong 14 \quad (8)$$

In other words, every pair of opposite electric quanta (q^+, q^-) splits into 28 thermions, i.e. $q = 2 \times 14\ \theta$ thermions, or

$$q = 28\ \theta. \quad (9)$$

This way we 'created' the neutron we give for the first time a direct and clear answer to the question what the antimatter became. Obviously it coexists with matter inside the neutron and the proton, as we shall see below.

The display of the neutron in **Fig.18** provides a direct explanation why in the bombardment of nuclei in accelerators, moving with high energy particles so many

subatomic particles are generated that scientists are in a difficult position to find give them new names. The remarkable thing is that through the hundreds of fragments, not even a quark has been found, a fact that should puzzle the experts.

7.3 The Beta decay and the proton

From nuclear physics we know that the neutron outside the nucleus is unstable, with an average lifespan in the 'empty' space equal to 14.8 minutes when it disintegrates into *a proton, an electron and an antineutrino*, as shown in **Fig. 19**.

As seen from the latter figure, a neutron that according to the existing standard model consists of three quarks (udd), decays into a proton (uud) and a '*potential*' *boson* W^-, which then decays into an electron e^- and an antineutrino of the electron $\overline{\nu}_e$, as shown in **Fig 19a**. The neutron (udd), can also be split into an antiproton, a '*potential*' *boson* W^+, a positron e^+ and an electron neutrino ν_e. In the latter case, the existing theory tells us that the potential boson W^+, created with the positron and the electron neutrino, *from void*, then the W^+ converts the neutron in antiproton, as shown in **Fig 19b**.

According to the usual theory we have two types of decay, the b- and the b+ decay, which can be represented by the following two equations:

$$n \rightarrow p + e^- + \overline{\nu}_e \tag{10a}$$

$$n \rightarrow \overline{p} + e^+ + \nu_e \tag{10b}$$

In the process of b- and the b+ decay a substantial change in structure and composition of the material occurs. In fact it constitutes a 'radical' reorganization, since the negative electron detached from the neutron *is bound* (captive mode) from the positively charged nucleus and forced to wander around it in a radius of about 10^5 diameters of the nucleus. *Captive (bound) orbits always exist when the forces are attractive*. The electron in addition to the rotation around the proton has an eigen-rotation spin which we call *spin*.

These are supported, in general, currently by existing theory, but the question: "Where was the electron (or positron in b+ decay) found from, within the neutral neutron?", *still remains essentially unanswered in this case*. The explanation that "neither the electron nor the neutrino *was ahead* in the neutron and that during the beta decay the internal structure of neutron changes so as *to release energy* in the form of both particles and transformed into a proton" is unconvincing. Neither the continuation of the explanation of the transformation of the neutron into a proton with reference to quarks is clear and unambiguous.

With the existing theory, a neutron contains two down quarks and one up, whereas the proton contains two up quarks and one down. The down quark has a negative electrical charge equal to 1 / 3 of the electron charge and the up quark has a positive charge equal in absolute value by 2/3 of the electron charge. So, if a down quark becomes an up quark, the difference is just a unit of negative electric charge. The absence of the aforementioned negative electrical charge (an excellent example that two refusals to make an affirmation) leaves behind a whole unit of positive charge. The neutron becomes a proton.

The negative charge goes along with the electron, while part of the excess energy goes to the antineutrino. Both the number of fermions and the total charge in the universe

remained the same. Since the mass of a down quark is greater than that of one up quark, while the mass is equivalent to energy, everything comes in a nice balance [23]. Nothing more than a simple balance between electric charge and mass energy.

But according to our view, the answer is obvious. In the model of the neutron we made, electrons and positrons "*coexist in neutral neutron*" as shown in **Fig.18**. As mentioned, we do not accept the existence of the quark, so we do not accept and explain the beta decay given by the above theory. But the beta decay is a *known and real natural event* on which we rely on the continued development of our theory.

We argue that during the beta decay, a *recrystallization* of the neutron occurs. The recrystallization is a process that occurs fairly frequently in nature and is well known to physicists. It is this process of recrystallization causing substantial changes in structure and composition of the material.

Given that the mass of neutron m_n = 939.566 MeV/c^2 and proton m_p = 938.272 MeV/c^2, the difference of their masses is m_n - m_p = 1.29 MeV/c^2. Given the mass of the electron m_e = 0.51099 MeV/c^2 this difference corresponds to 2.52 electron masses. Thus the explanation given by the existing theory and illustrated by the diagram of **Figure 19** does not accurately reflect the reality, since the neutron has lost a total of 2.52 electron masses.

By recrystallization of the neutron that we suggest, in line with what we have mentioned so far, the conversion mechanism should be the following. In principle, the neutron has 12 components. The proton in which it will be recrystalized should have *mandatory*, first an odd number of electrical charges at each edge, and secondly at 8 vertices of the crystal to have a positive electrical charges (for the b- decay) This leads us to the conclusion that each edge must be 11 basic particles, of which 6 are positrons and 5 are electrons. In this way we ensure that the overall crystal is positively charged like the proton and this is achieved by recrystallization of the molecule of the neutron.

A crystal consisting of 11 alternating positrons - electrons in each of the edge comprises a total of 11 × 11 × 11 = 1331 basic components of which 666 are positrons and the rest 665 are electrons. Besides, to insulate these 1331 construction units, 15730 thermions are required, the latter having equivalent mass 15730 /396 = 39.7 m_e (m_e = electron mass). Thus the crystal has been an equivalent mass of 1331 + 39.7 = 1370.7 electrons.

As the mass of the proton m_p is 2.52 m_e less than that of the neutron, which is 1836 m_e, so the mass of the proton will be m_p = 1836 – 2.52 = 1833.48 m_e. The crystal of the proton is therefore heavier than the crystal we created on 11 basic structural components in 1833.48 -1370.7 = 462.78 m_e. If we divide this weight by the number of surfaces of the crystal, we obtain 462.78/6 = 77.13 m_e.

Assuming that in each surface, and symmetrically from the center, there are two more sets of basic components (electrons and positrons), one with a 7 × 7 = 49 elements and the second with 5 × 5 = 25, then for each surface we will have 49 + 25 = 74 m_e. The remaining 3.13 m_e, which correspond to 3.13 × 792 = 2478, are the thermions to insulate electrons from positrons (in the last two rows of **Fig.20**), as well as the mass of neutrino that was detached during the beta-minus decay.

Certainly the picture described for the various elementary particles is a very idealized case of perfect crystals in which the lattice structure extends uninterrupted and without disturbances throughout the material. In nature with countless trillions of trillions of basic building blocks (thermions monopoles, dipoles) had to build, real crystals have a variety of deviations from this idealized form presented. Today it is known with absolute certainty that in a macroscopic crystal, there may be additional atoms in positions who

should not, and also there reticular voids in places that should be owned by atoms and are not held. As an example we can mention semiconductors, where a foreign atom occupies normal lattice position, such as arsenic atoms in silicon lattice, an anomaly with great interest in practical applications. Also *isotopes* that exist in all the well-known elements are also an exception to the rule of strictly defined crystallization. In this case, an element with a given atomic number *Z* (number of protons) is not always the same number *N* of neutrons. As an example, think of the element hydrogen which is also meet as Deuterium or Tritium.

7. Conclusion

From all this detailed presentation, it is naturally concluded that the proposed particles, *θετικόνια* (Thetikonia), the *αρνητικόνια* (Arnitikonia) and *θερμιόνια* (Thermions), not only do not face any difficulty so as to be the basic building blocks of matter, *but they give us more realistic and more convincing simple explanations of the various physical phenomena*. Using the three proposed particles, the gravity is not considered as a special type of force but it is a result of electric (attractive-repulsive) and electro-thermal (attractive) forces. Also, the weak and strong nuclear forces are not included in the proposed model. In Part II of this article, we will present in detail the Creation (three additional lines of resistance), after the presentation of Thermo-Aether that plays a key role in the further evolution of the universe.

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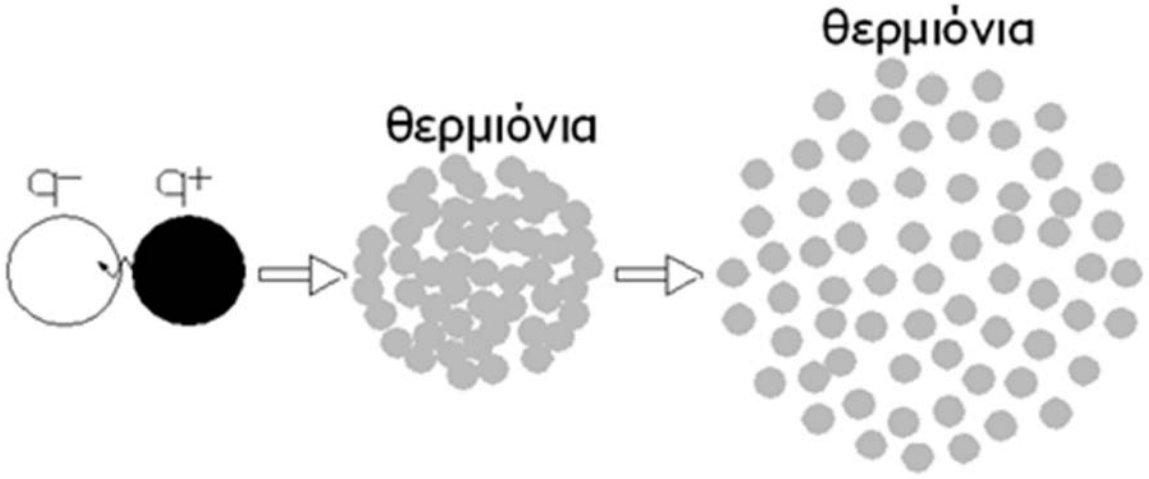
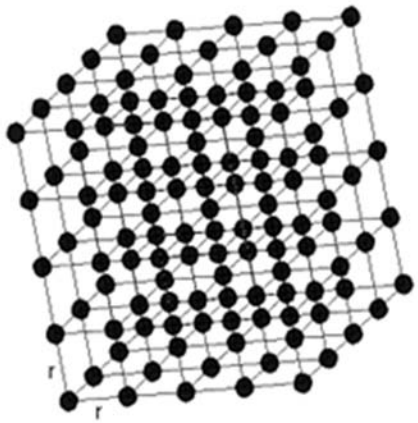


Figure 1: Scattering of the high level compact electric energy (q^+, q^-), which is transformed into low level thermal energy (*θερμιόνια, thermions*) while producing work.



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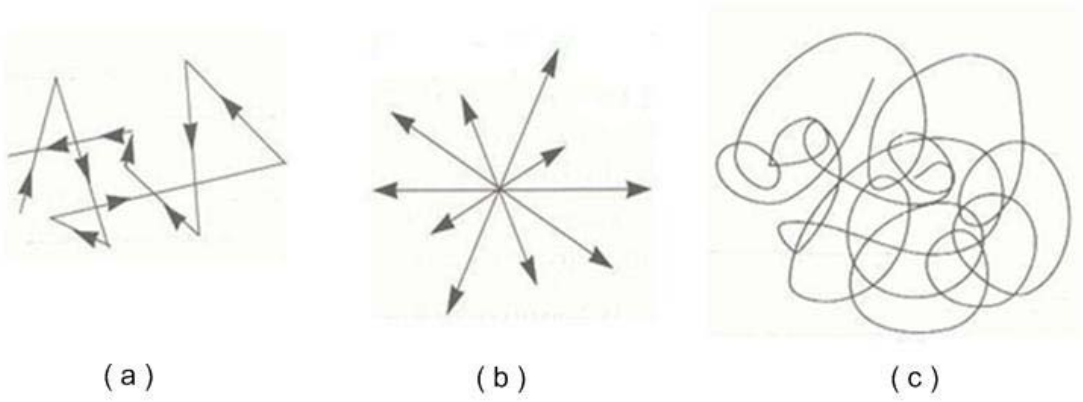

Figure 3: Molecular motion in (a) gas, (b) solid and (c) liquid.

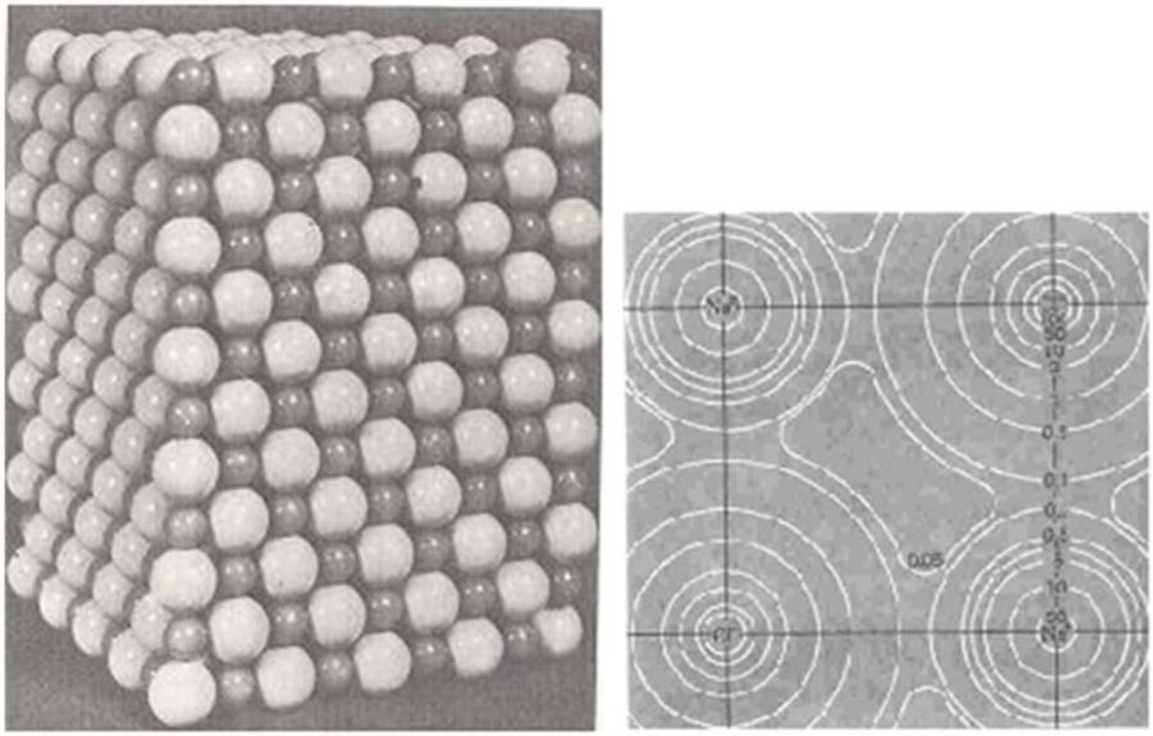

Figure 4: Model for the crystal structure of sodium chloride (a) in the form of spheres and (b) in the form of fields.

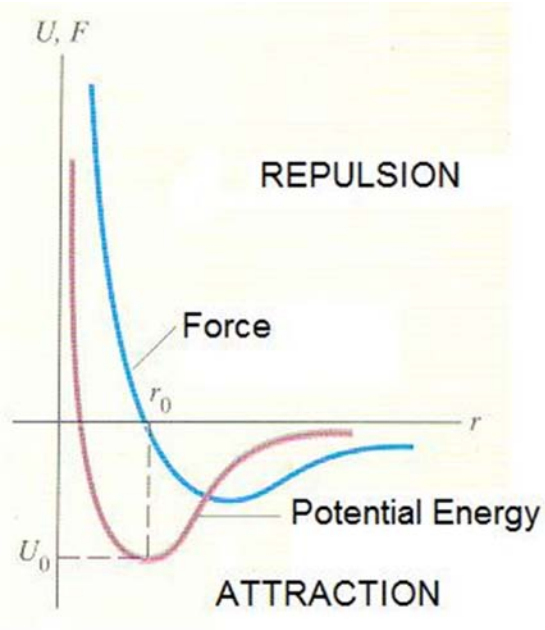

Figure 5: intermolecular interactions in solids

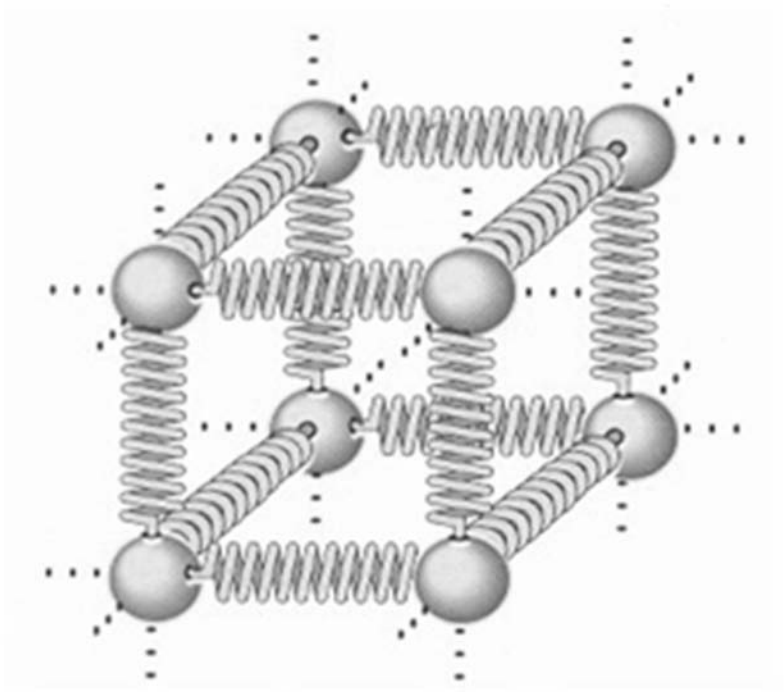

Figure 6: Simulation of diatomic forces in a solid through springs.

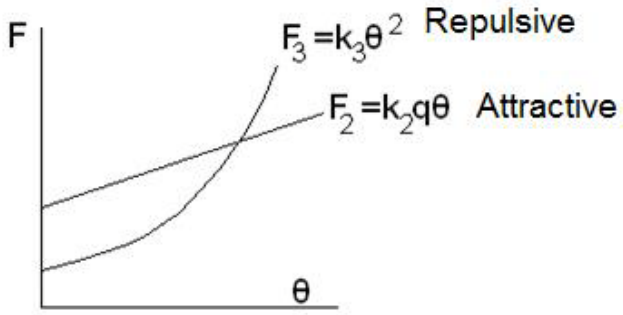

Figure 7: Nonlinear explanation in heating (in both forces the factor $1/r^2$ has been omitted).

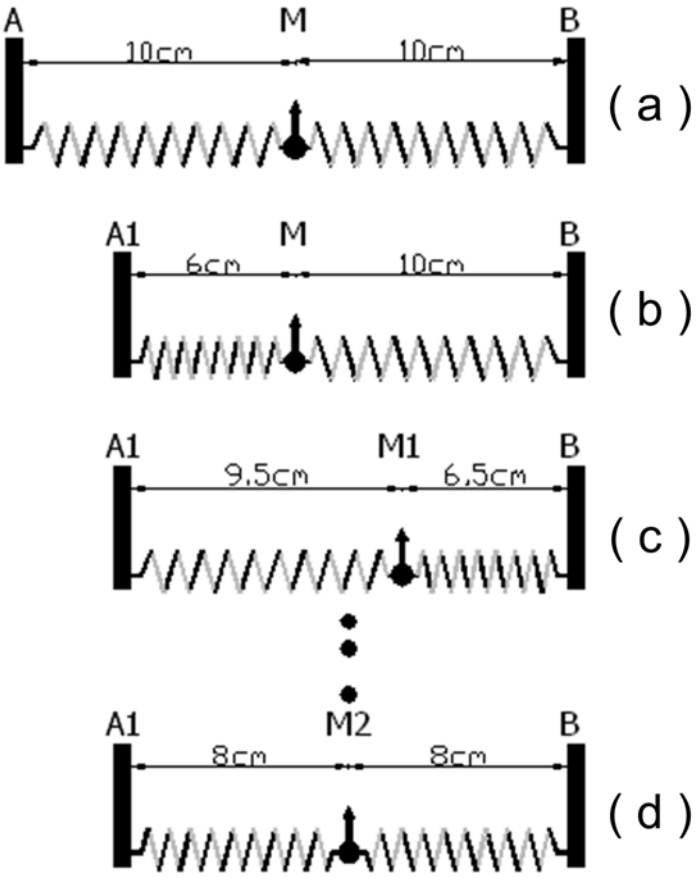

Figure 8: A particular vibration which eliminates energy anomalies in a closed homogeneous system and hence in the Universe.

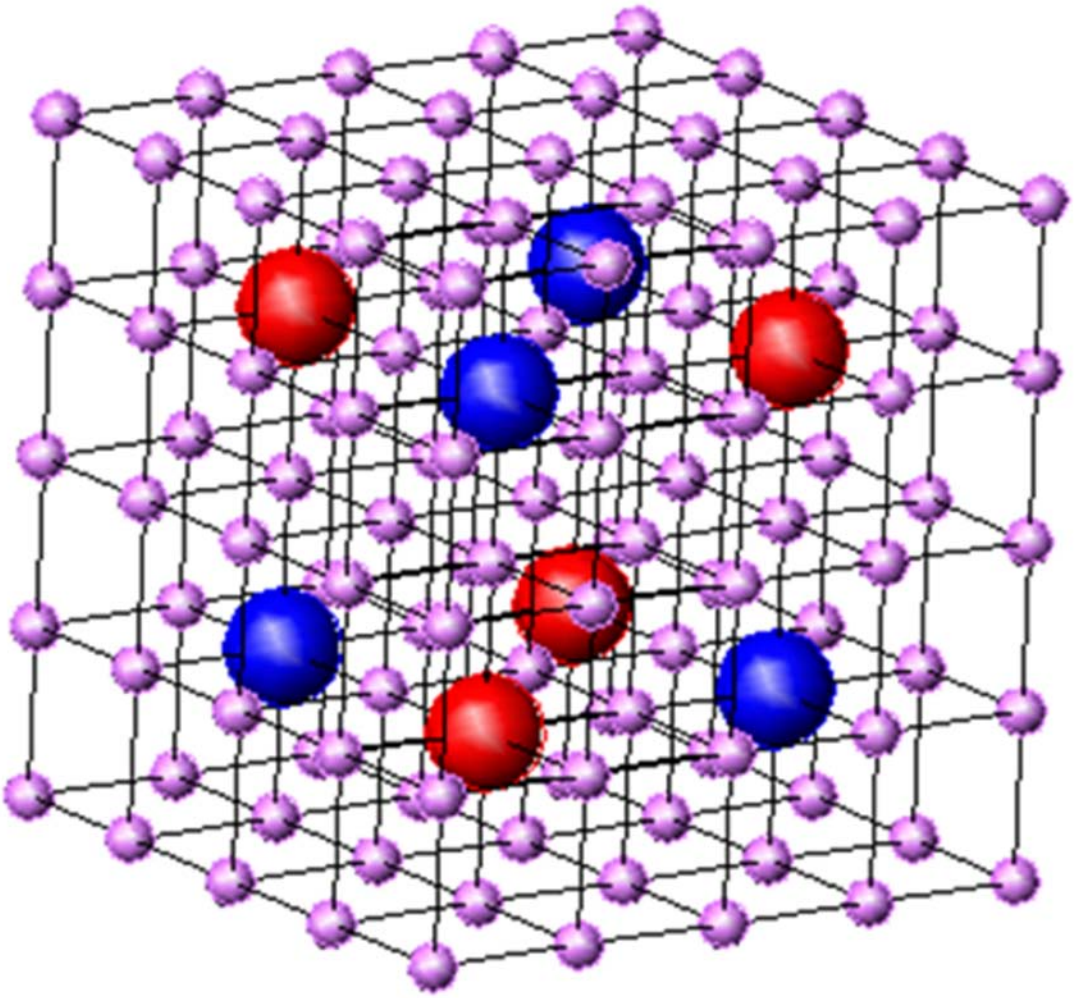

Figure 9: Representation of material combination (four dipoles) with the grid of thermions (Red and blue balls correspond to positive and negative electric quanta whereas the small purple balls correspond to the thermions).

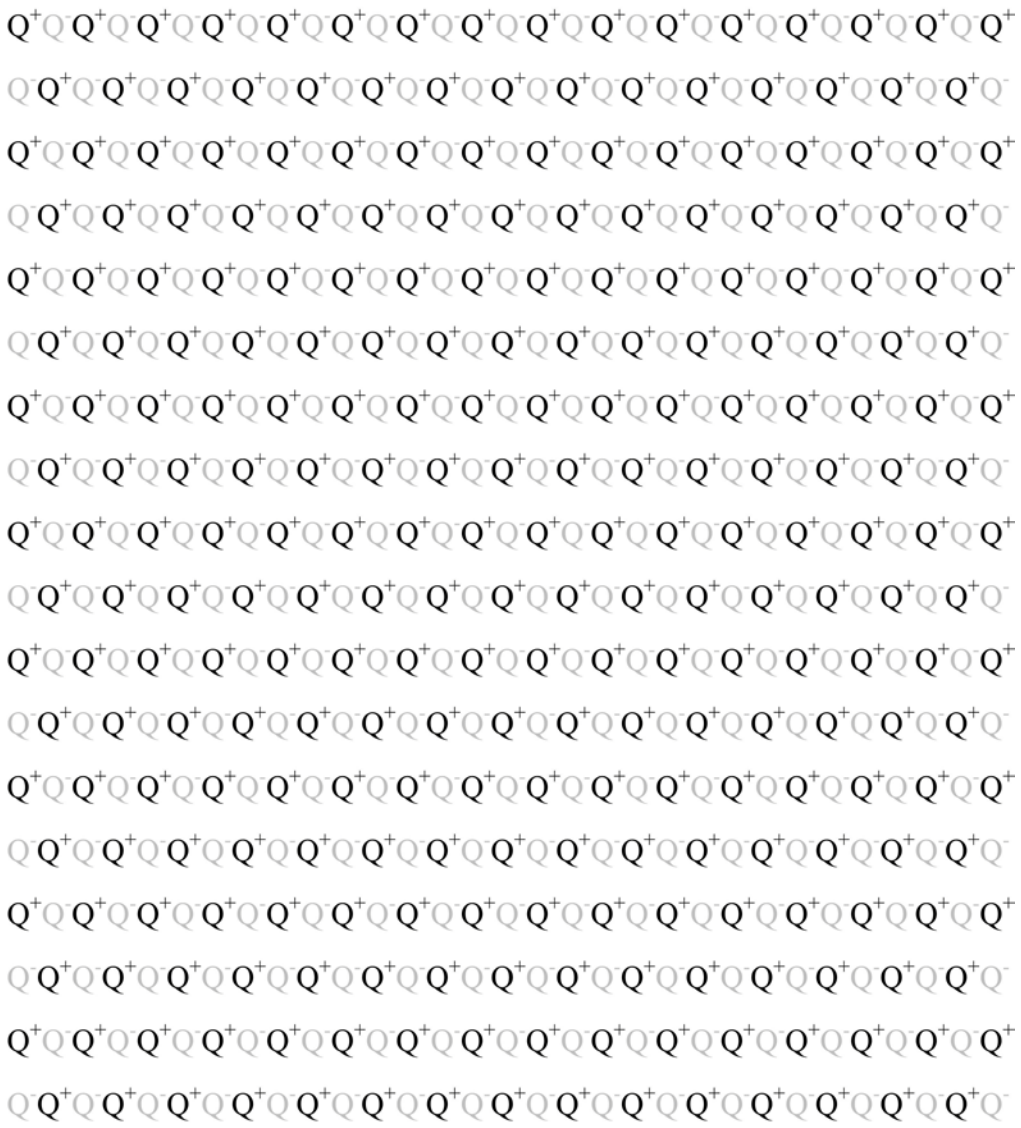

Fig. 10: Profile of the electric charges generated by the random disorder, distributed in an extended region of space with a symmetric manner to form the unstable peculiar *NOTHING* *

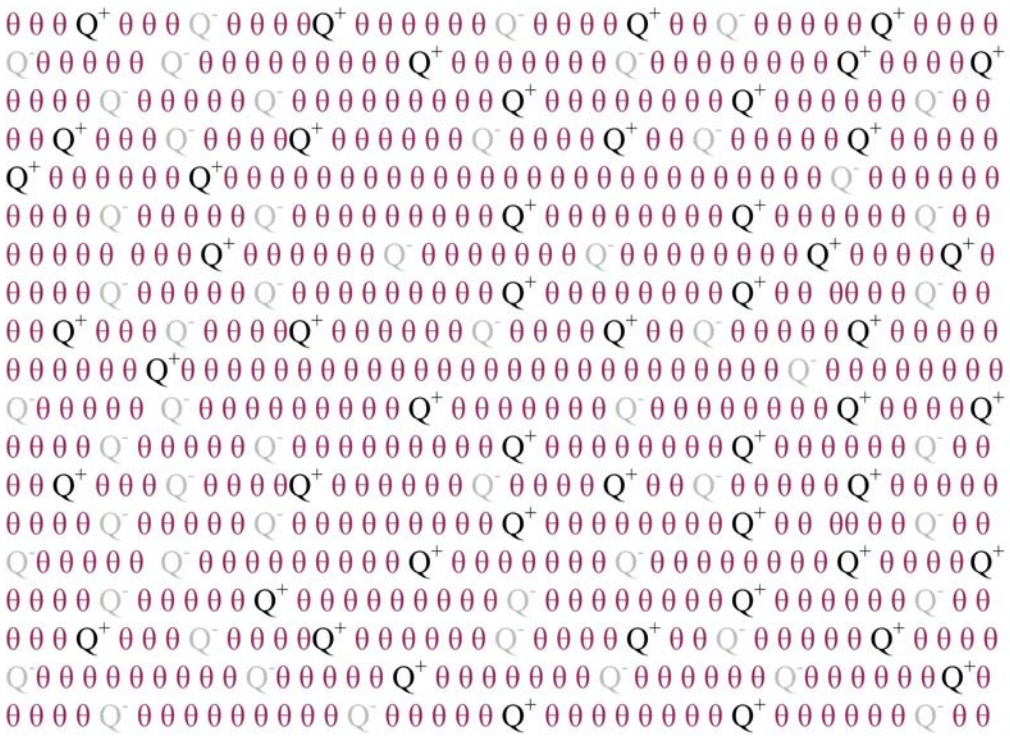

Fig. 11: Schematically illustration of what happened after the initial reaction to destroy a large percentage of high-level energy in Universe.

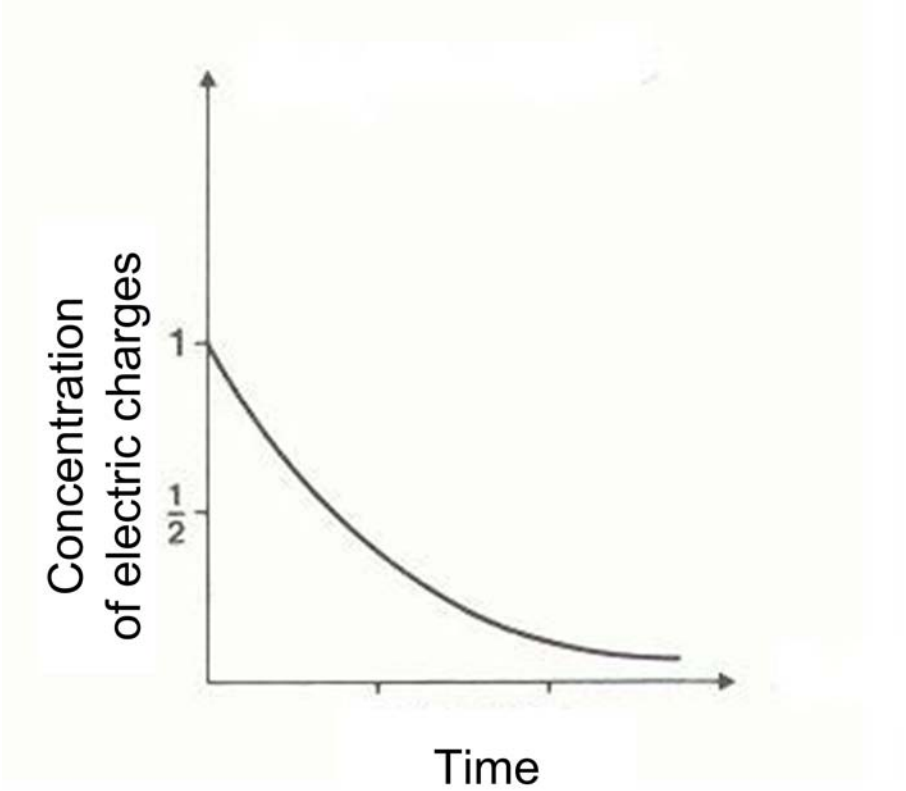

Figure 12: The reaction rate is proportional to the concentration of electric charges.

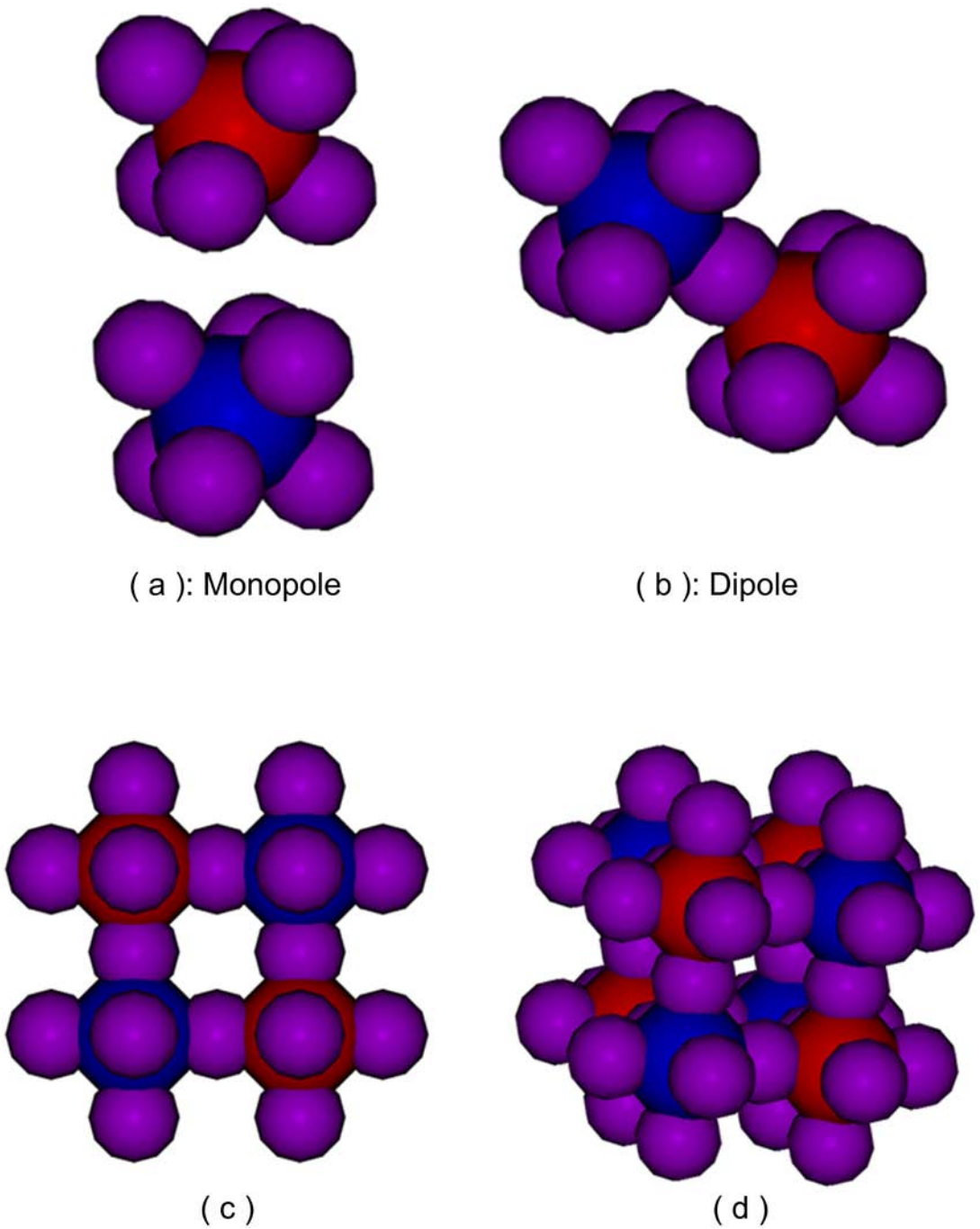

Figure 13: (a) Monopole, (b) Dipole, and Material morphemes of (c) two dimensions as well as (d) three dimensions. The red and blue balls represent the positive and negative electric quanta, whereas the purple balls represent the thermions.

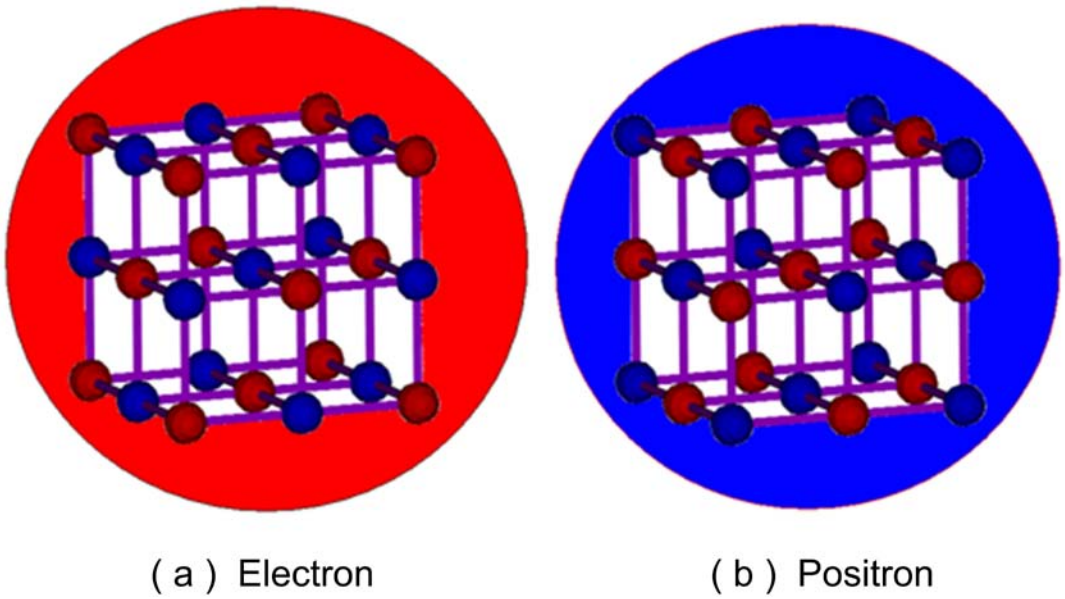

Figure 14: Schematic representation of electron and positron in the proposed model.

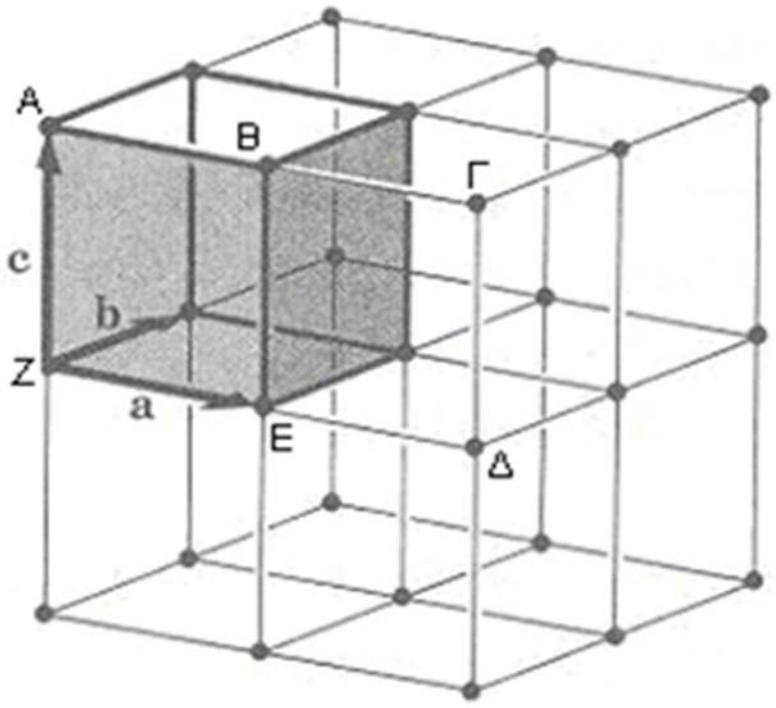

Figure 15: Schematic representation of a cubic crystal.

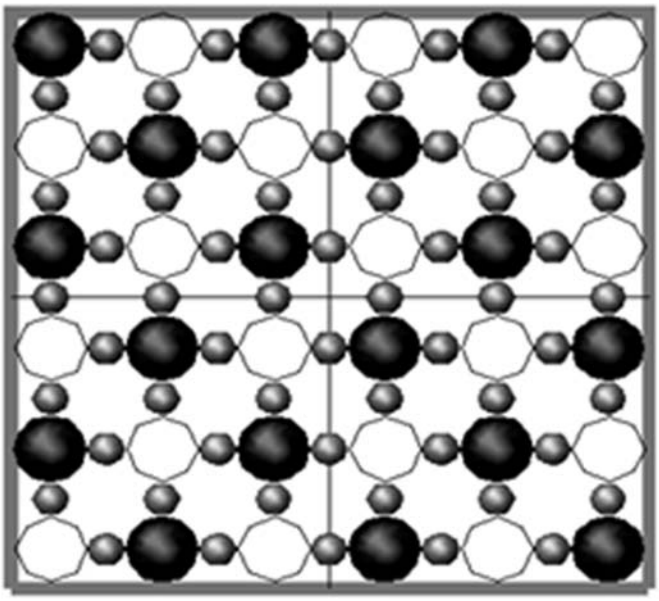

Figure 16: Union of four Electrons - Positrons insulated by thermions.

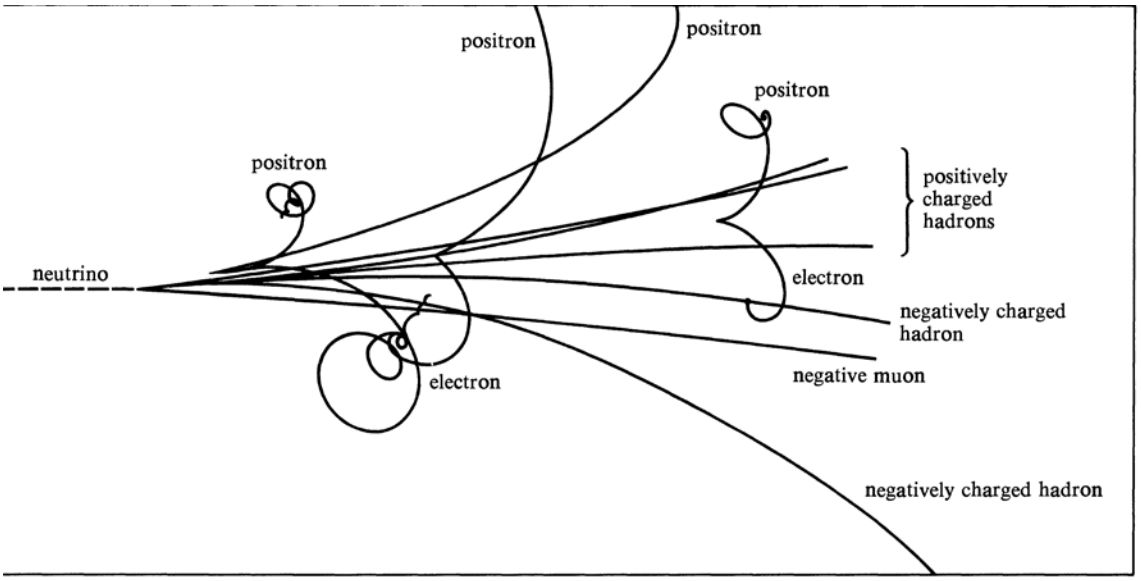

Figure 17: A jet of debris emerges from a proton struck by a high- energy neutrino. The event is captured photographically via trails of bubbles left as charged particles pass through a chamber of superheated hydrogen. (From Jacob and Landhoff, Scientific American, March 1980, p. 67.).

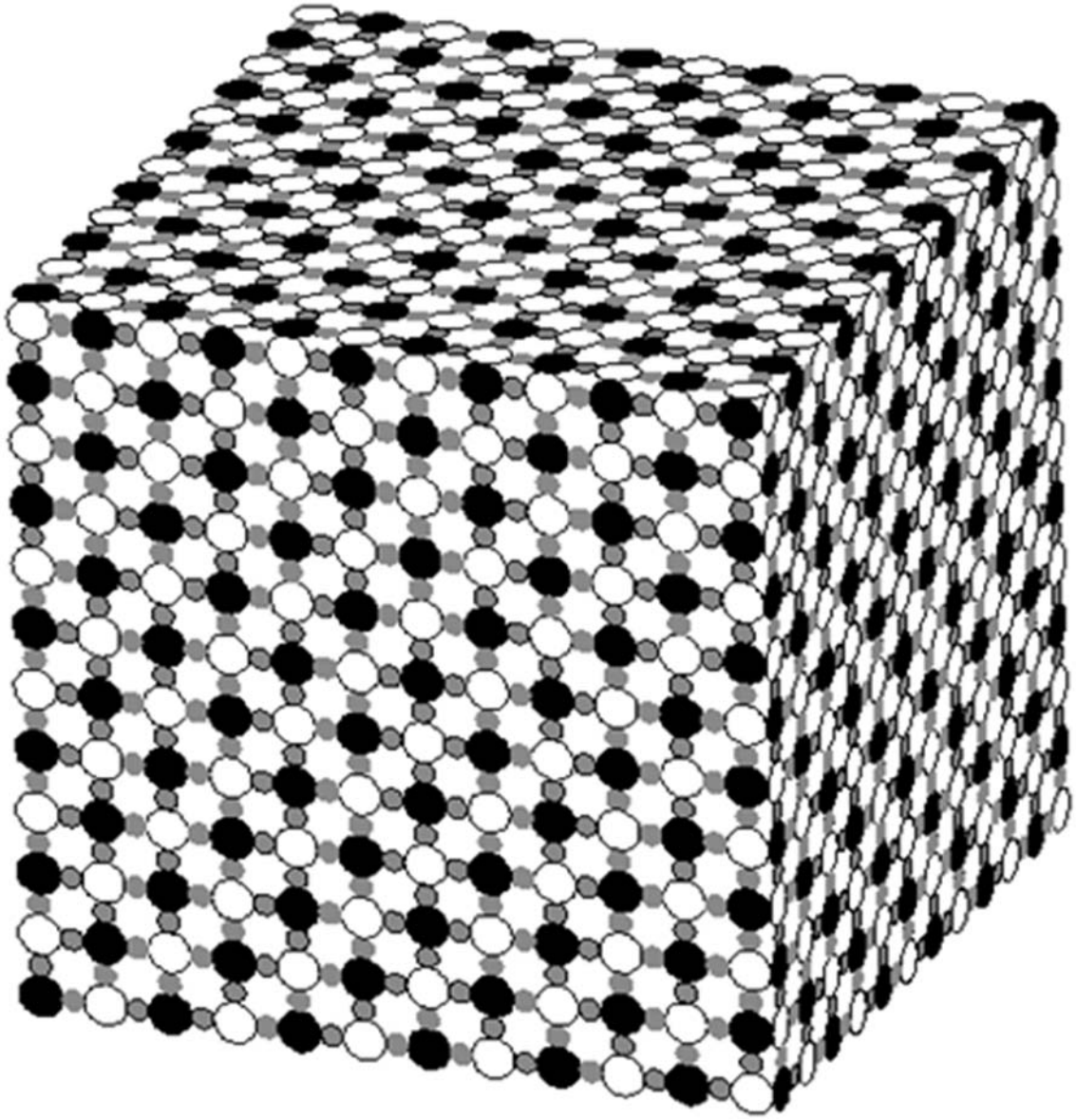

Figure 18: Model of a neutron consisting of six electrons and six positrons per edge.

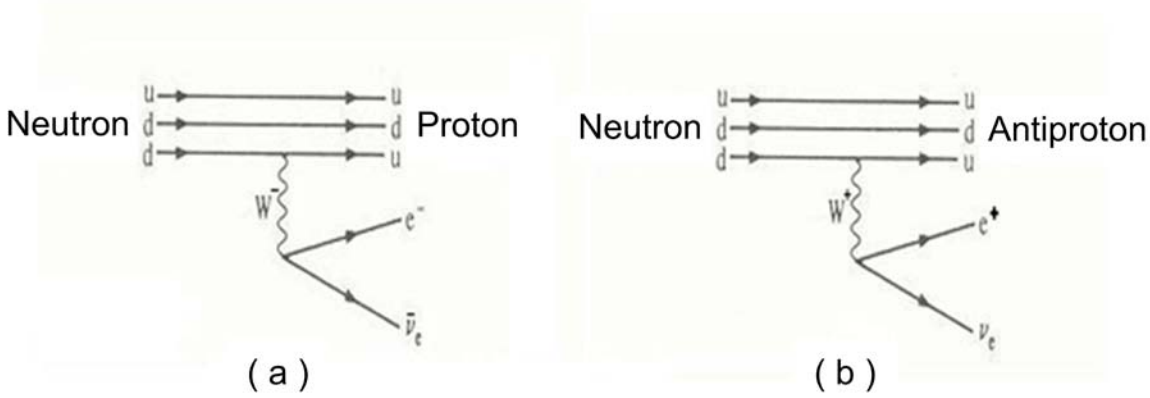

Figure 19: Neutron disintegration into a proton, an electron and an antineutrino.

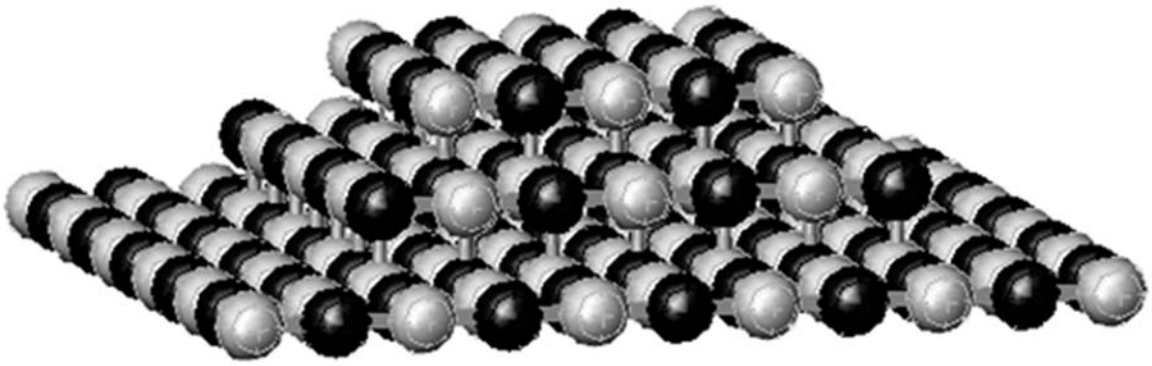

Figure 20: Details of the surface of the model of a proton.

TABLE 1: Breakdown of thermions and pairs of electric charges versus to cube side

Edge of cube	Internal Thermions	External Thermions	Sum of Thermions	Pairs of Electric charges	Coefficient	
					λ_1	λ_2
Dipole	1	10	11	1	1:1	1:11
3	54	54	108	13	1:4	1:8
4	144	96	240	32	1:4,5	1:7,5
5	300	150	450	62,5	1:4,8	1:7,2
6	540	216	756	108	1:5	1:7
7	882	296	1176	171,5	1:5,15	1:6,85
8	1344	384	1728	256	1:5,25	1:6,75
9	1944	486	2430	364,5	1:5,34	1:6,66
10	2700	600	3300	500	1:5,4	1:6,6
11	3630	726	4356	665,5	1:5,45	1:6,55
12	4752	864	5616	864	1:5,5	1:6,5
.	.	.	.	.	.	.
.	.	.	.	.	.	.
100	2970000	60000	3030000	500000	1:5,94	1:6,06