Elementary Particles: A New Approach

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ABSTRACT: It is shown the inexistence of neutrinos to define precisely the concept of relativistic's mass; under this scheme, to elementary's particles as electron and interaction's particles like photons correspond an electromagnetic and virtual mass. Nucleons (protons and neutrons) have real or inertial mass for being composite particles, since inertia needs structure: it is provided by an interactive network originated by strong and weak forces. This mass is building up atoms and all the material world under Classical Physics and Chemistry's laws.These actual masses may be considered as electromagnetic and virtual one (thanks to its charge), in order to establish the high energies level needed to obtain all particles physics (elementary or not), which are governed by the laws of Quantum Physics. With all this, one may set up amore reasonable and understandable new Standard Model, which being projected into Cosmological Model can get rid of some inconsistencies and concepts difficult to be admitted.

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1. INTRODUCTION

Standard Model of particle physics is currently difficult to sustain with the conceptual bagagge supplied by the orthodox approaches to relativity and quantum mechanics, so that both theories appear no longer modern but old (classic); this requires a rigorous critical analysis. Symmetry based on the invariance of the characteristics, parameters or physical quantities is a usefull tool to refine the limits or conditions to which they must adjusted, but the mathematical barrage that has been subjected Particle Physics leads to a rather confusion or at least difficult to assimilate. In this sense, the headlong rush that involves the implementation called Supersymmetry (SUSY), string theory and superstring adds even more fuel to the fire of misunderstanding. In addition, it still has been using the term of Quantum Mechanics to the microworld's study, when the concepts of trajectory and speed, acceleration, etc., very accurate from a mechanical point of view, isfading in quantum processes. So, when trying to explain the power curve (spectrum) of electrons emitted in betaradiactivity by masses and kinetic energies as though they were classical particles, it seems to forget that the origin of quantum phenomena is coming on Statistical Physics from the interpretation of the black body radiation's graphic with the introduction of energy quanta or quantum particles, characterized by parameters of electromagnetic's wave. The relativistic theory seems to solve all these issues with the mass-energy concept, but a thoroughly study of the method for obtaining the famous energy's formula has led us to the conclusion that it is only a merely conceptual artifact signifying nothing Author details:

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2. EMPIRICAL DATA

The particles, so called elementary are those having no parts or structure and so far are usually classified into two groups: quarks and leptons, but the name given to the second (meaning light) seems not very precise, since tau (τ) particle as it can be seen is greater than that corresponding to proton (hadron meaning heavy).

Charge (e)	Mass (MeV)	quarks:
u (up)	+2/3	1.5 – 3.3
d (down)	-1/3	3.5 – 6.0
s (strange)	-1/3	70 – 130
c (charmed)	+2/3	1160 – 1340
b (bottom)	-1/3	4130 – 4370
t (top)	+2/3	9,000 – 173,300
leptons:		
e (electron)	-1	0.511
μ *(muon)*	-1	105.6
τ *(tau)*	-1	1784.2
ν_e *(neutrino)*	0	0
ν_μ *(n. muonico)*	0	0
ν_τ *(n.taunico)*	0	0

We have considered that neutrinos had no mass, since there is no experimental evidence for it and turns out absurd that in some tables some quantities below certain values appear. The particles called hadron are composite from *quarks*, but we are going to be limited to those called *baryon or nucleon* which are the responsible to form atomic nuclei and therefore they constitute the necessary bricks to build the ordinary matter:

p (proton)	+1	938.2
n (neutron)	0	939.5

2.1. THE MASSOF QUANTAOR PHYSICS PARTICLES

1. Elementary particles (electromagnetic and virtual mass):

As we can see, the parameter defining the physics particles, elementary or not, are charge and mass, the first of which has a clearly defined value while the mass is a data referring to the latest measurements. It is curious the insistence on the idea that the essential feature of any elementary particle is its mass, especially after the latest news about the so-called *Higgsboson.*Some authors on

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Quantum Theory (P. Roman and Messiah) called attention respect to Dirac electron theory on the fact that is not over a particle with a *mass* as any of classical mechanics, but rather a *charge* or a set of them (multiparticle) as it is required by Quantum Fiel Theory. Everything comes from the Theory of Relativity with its **unifyingparadigm** trying to unite Clasics Mechanics and Electromagnetism; to date the acceptance thereof is presented as "indisputable", since the most famous equation of Physics,   E = mc^2 (1) explains the great energy that are at stake in nuclearprocesses. If we add the General Theory, Gravity becomes the guide of the   forces   governing   the   Universe   through   the geometrodynamics and*mass* would be the cornerstone of it as cause or source of a universal interaction, with which optimism seizes astrophysicits, since apparently they have all instruments theoretical and practical to give a full explanation of the Cosmos's evolution and its original But, there are "clouds" that anyone may appreciate:
1)   The impossibility until now of carrying out a successful gravitational field's quantization, despite the enormous mathematical display,   casting doubt on Relativity General Theory, that is, on the application of gravitation at all levels.
2)   Tests on the attraction of light by Sun are of dubious credibility: these were made first by Eddington in 1919, giving   credit to relativistic theory;   something rather fast for a very difficult experiment to make, because this has to be done during a total solar eclipse and to measure the deflexion of a light beam from a distant star. About that, we can see that in 1962, M. Born ("Einstein's   Theory   of   Relativity"):   states: "...an agreement between theory and practice have not been yet fulfilled". On the other hand, Special Relativity Theory is not without surprises:

a) Energy equation: E² – cp^2 = $(m_0c^2)^2$ (2) turns out to be an **identity!;** indeed, if we use the relativistic mass, $m = m_0/\surd(1-v^2/c^2)$ (3) and putting it at (1) and at momentum $p = mv$ (4) and finally take them to (2) we may see   this   is reduced to $(m_0c^2)^2 \equiv (m_0c^2)^2$ie, an identity. The first consequence is that m_0 can not be rest mass, because we have seen that v disappears, and also for building the quadratic equation (interval) is only possible through moving frames, ie. v can not be null despite the temptation to use the expression (3) as an equation, but this is nothing more than a relationship by virtue of a definition. So, it is not possible a relativistic dynamics (our article: "Relativity: theory impossible"), thereby gaining in clarity, since we can not understand the existence of two types of mass (transverse and longitudinal).

b) An "identity" only allows us to use both sides independently; in this sense, we may use the formula (1) expressed as E = $m_0/\surd(1-v^2/c^2$, which shows the variability of mass due to v assigned to the moving frames; although these are defined as inertial it has no physical basis, since inertia requires the appearance of forces (inertial forces) originated inside the body or particles's parts and so far is not applicable if m corresponds to an elementary particle.

c) That mass acquires physical meaning only through the electric charge (e) and the potential, V, which justifies the electron-Volt (e*V*) unit defined by e V = mc^2. Moreover,

in the emission energy by atoms it is fulfilled:$mc^2 = h\nu$, where *h* is the Planck constant action and ν the radiation frequency. We can, therefore, establish the double equation:

$$eV = mc^2 = h\nu \quad (5)$$

In it, we see that relativistic mass, *m*, is like paper money between electromagnetic parameters, such as charge, *e*, electric potential, V, andfrequency of radiation, ν; therefore, it seems logical, the nature of **mass** was **electromagnetic** and as the intrinsic value of any actual money, **virtual.**
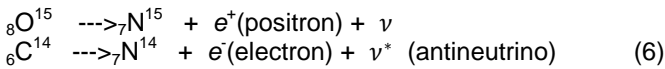
d) As quantum processes (Quantum Field Theory) can only work with multiparticles which require statistical treatment, the registered energies are not well defined as it would be with each individual particle; so, the mass awarded to each particle (elementary or not) can only be approximate and indicative of its energy levels, which it explains the data presented above.

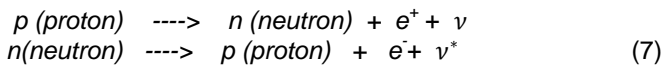## 2. Composite Particles (real or inertial mass)
Proton is currently regarded as the most stable of all known particles, so we can say that is the cornerstone with which Nature builds the whole matter of the Universe.We can also see the sum of the masses of quarks components, *u, u, d* for proton and *u, d, d* for neutron are no more than a 2% of nucleon' s mass.For this reason some authors like Chris Quigg (CERN Theory of Group), states: "..Hadrons such protons and neutrons represent *matter of a novel kind.."* adding"..it is confinement energy..". All this is possible thanks to **strong interaction,** by which the quarks are keeping bound together so tightly that they can not go out to *exterior or ordinary space,* due to an interactive network produced by *gluon field* and the phenomenon called "confinement".   It is easy to reach the conclusion this "new class of matter" is no more than actual or inertial mass;   in other words, **strong interaction** allows the construction of **real or inertial mass,** which as indicated above needs structure (internal forces). This mass may be expressed in *eV* unit, due to its charge, in which case it could be   electromagnetic an virtual as any quantum particle, but actually, as a real or inertialmass will be expressed in atoms mass unit (*amu*) to fulfill its true function: forming atoms, which with the helping of Avogadro N°, after ascending to macroscopic level, it may expressed in g or Kg. Moreover, protons are not isolated, because in the simplest case of hydrogen atom it does not take long for being associated with neutrons forming deuterium, $_1H^2$ and tritium, H^3. The union of those particles occurs in atomic nuclei (hence the name of baryons or nucleons) by**weak interaction,** a different force of the precedent one; with it, nuclei are configured as an *abstract, inner space*, where protons and neutrons are transformed into each other indefinitely underand united by gauge bosons, which unlike photons are charged, but like these they will have **virtualmass**. Their high energies (80-90 GeV) can be obtained by the weak charges (coupling constants) associated with those particles and the potentials obtained by the Fermi phenomenological equation, but its masses can not be inertial since the same have no structure (our article: "Charge in Quantum Theory").

3. THE MISSING ENERGY PROBLEM: NEUTRINOS

In 1931 Pauli predicted the existence of a particle called **neutrino** by Fermi as a result of radiactivedecaybeta, β:

$$_8O^{15} \;\; ---> _7N^{15} \;\; + \; e^+(\text{positron}) + \; \nu$$
$$_6C^{14} \;\; ---> _7N^{14} \;\; + \; e^-(\text{electron}) + \; \nu^* \; (\text{antineutrino}) \qquad (6)$$

The explanation for the introduction of this particle is based on the supposed "missing energy" of electrons or positrons emerging, as their kinetic energy is not always the same as can be seen at the power spectrum curve; in order to remedy this, neutrino and antineutrino had to be introduced to accompany the electron or positron as carriers of the"lost energy". How these particles can transport energy if they have neither mass nor charge?; for this reason, the desperate search of mass (Super-kamiokase). But the question does not end here, because to be more precise the precedent reactions are usually expressed:

$$p\,(\text{proton}) \;\; ----> \;\; n\,(\text{neutron}) \; + \; e^+ + \; \nu$$
$$n(\text{neutron}) \;\; ----> \;\; p\,(\text{proton}) \; + \; e^- + \; \nu^* \qquad (7)$$

Neutron is a particle that has greater mass, so the energy emitted is coming from the mass's difference between the two particles, according to relativistic expression: $E = \Delta m\, c^2$ (8);   therefore the second reaction must be spontaneous, in consonance with the known "instability" of neutron, but for the first one an energy input is needed. However, from the equations (6) we cannot infer any mass' difference because the initial and final nuclei have the same mass numbers, ie, they have identical mass. How to reconcile the two apparently contradictory situations?. We believe that is only possible through the existence of two types of masses, as we have said previously, so that the **mass** appearing in (8) must be **electromagnetic** and **virtual**, while in (6) **real**or**inertial**. Moreover, if we realize the origin of Quantum Theory is in Statistical Physics, with the interpretation of the black body radiation spectrum, when trying to interpret the power curve of the emitted electrons or positrons (both very similar to that of the black body radiation) with well-defined masses and kinetic energies as though they were classical particles, it is completely **wrong.** Actually, they wouldhave to be treated as multiparticles as Quantum FieldTheory claims; in other words, there is no **loss** of **energy** and neutrino' s existence at *the exterior or ordinary space* "does not have to occurs", but it is possible to locate it in the *inner abstract space* mentioned above. In doing so, we will avoid questions of difficult, if not impossible, reply:

a) How can we accept the Earth is continually being crossed by billions of neutrinos from Sun, as energy's carriers without taking place any alteration?

b) How is it possible that the evidence of neutrino's mass was so elusive, when its energy is entirely due to a mass defect?

4. SPINANDPARITY

Violation of Parity, which was the other argument used for the acceptance of neutrinos, it became clear with the famous experiment of Co-60:

$$Co^{60} \;\; ----> \;\; Ni^{60} \; + \; e^- \; + \; \nu^* \qquad (9)$$
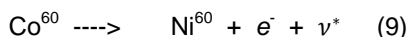
where it is found a higher proportion of emerging left-handed electrons, ie, with s = -1/2; since then, it has been accepted that it happens on account of the antineutrino, ν^*, whose spin is   s = +1/2, forces the electron to have that orientation;   it is not something casual, because neutrinos are always left-handed, ie, s = -1/2, while its antiparticle must be right-handed, s = +1/2;   in this sense, neutrino is like a "vampire particle", since cannot be seen itself in a mirror. It is known that physics or quantum particles must follow the rule imposed by **SymmetryCPT**   (charge conjugation, parity and time reversal), with which may assume the non-conservation of Parity if simultaneously it is producing a charge's change   (conjugation) and an evolution backwards in time. With this, we may explain the transformation that leads to beta decay occurs within the atomic nuclei (*inner space),* at the same time that   gauge particles are acting on account of weak interaction. Indeed, as neutrino have no charge, when applying that symmetry to any of radiactive decay, time reversion allows us to take antineutrinos from the right side of the reaction to the left side, converting it in neutrinos, because the have opposite parity; so, the transformations (7) can also be expressed:

$$n \; + \; \nu \; ---> \;\; p \; + \; e^- p \; + \; \nu^* \; ---> n \; + \;\; e^+ \qquad (10)$$
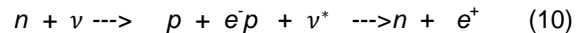
Moreover, beta decay, originated in atomic nucleus (*inner space),* is a process of true "creation" of electrons or positrons, which it conform to the   Gell-man Nishima charge formula: $Q = t_3 + Y/2$ (11), where t_3 is the isospin component whose value has been associated with that of neutrino   (t_3 = -1/2) and antineutrino (t_3 = +1/2). Such formula may be applied to reactions expressed in (10), whereby the electron obtained by $n \; + \; \nu$ ---> $p + e^-$ must have a spin equal to that of the neutrino, ie   s = -1/2 o left-handed   and also if we consider that   Y = -1, its charge will be   Q = -1/2 – ½ = -1. Similarly, for the positron by $p \; + \; \nu^*$ ----> $n \; + \; e^+$ we can easily may check that its spin will be   s = +1/2, ie, the same of the antineutrino or right-handed; in this case the hypercharge, Y = +1, so the charge will be   Q = +1/1 + ½ = +1. We have seen, the production of   left-handed electrons and right-handed positrons it need not be accompanied by antineutrinos and neutrinos, respectively, as these remain in the nucleus (*inner space)*, influencing the true orientation of the true emerging particles, e^- and e^+ to *exterior or ordinary space,* fulfilling the conservation's law of **angular momentum.** Finally, let us see the problem of *muon*, that appears in a natural way in cosmic rays at sea level on Earth from the Sun; it is equal to the *electron* but much more massive and also may be obtained from pion (π^-) decay. *Pions* (π^o, π^+, π^-) are intermediate particles, called *mesons,* (although they are *bosons*),   compounds of *quarks* and *antiquarks*, which are like an exteriorize of nuclei (*inner space),* explaining its great instability, since it decay in less than 10^{-6} s, according to $\pi^- \; ----> \mu^- \; + \; \nu_\mu^*$. Given that the energy problem can be explained in the same way we have done previously, once again we may get rid of such "particles". To emphasize this fact, we are going to see in what follow that it does not take much insight to question the evidence about the existence of neutrinos.

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5. NEUTRINOSDETECTION

1. In 1956, F. Reynes and C. Cowan made the first "detection" using antineutrinos from a nuclear reactor to cause the transformation: $v^* + p \longrightarrow n + e^+$ which coincides with   (7).   How to admit that the reaction is produced by antineutrino from the nuclear reactor?   It may easily undertood the proton had been activated or excited causing the emission of positrons, in consonace with the explanation given above.

2. Super-Kamiokande: According to this sophisticated experimental device, the neutrinos coming from the Sun, provided with such a high energy, are causing to electrons in the water so enormous speed that it is greater than the corresponding to the light in the same medium, producing the so-called Cherenkov's radiation;   then by a photomultiplier it is possible to "prove" the existence of such neutrinos and their masses under the oscillation produced between muon and electron neutrinos. Why are not the muons themselves (with charge) from the Sun, provided with high energy, that perform this task?.   If it refers to the barriers placed, how is it possible that neutrino which it cross all barriers can be trapped by electrons belonging to water molecules ?

3. The radiochemical methods such as $Cl^{37} \longrightarrow Ar^{37}$ and $Ga^{71} \longrightarrow Ge^{71}$
that are based on the transformation $v + n \longrightarrow p + e^-$ are not acceptable,because it coincides with our precedent interpretation : neutrino it is inmerse in the proper nucleus (inner space).

 4. TheIcecube as a neutrino detector had been quite some time without detecting anything (.."for more than a year of operation we could not see anything.."   had said N. Whitehornfrom University of Madison. Wisconsin)   and although in recent months it appears to have been detected about twelve particles from distant stars or galaxies, it turns out a fact of little credibility that was due to neutrinos.

6. TOWARDSANEWSTANDARDMODEL

What can we say of the electrons created in addition to being left-handed?. Simply they become part of the huge amount of particles that populate the Universe and may be associated with other right-handed electrons, ie. $s = +1/2$ and participate in the atomic structure itself according to thePauli exclusion principle. For its part, each positron must be right-handed, that is, with spin, $s = +1/2$ and as such its inmediate destination is to be inmolated with an electron of the same spin becoming photons, $s = +1/2 + \frac{1}{2} = +1$; this transformation is usually expressed: $e^+ + e^- \longrightarrow 2\gamma$ (12), but it also may done with an left-handed electron, so that the resulting spin would be $s = +1/2 - \frac{1}{2} = 0$ similar to any other boson, but it may well be justified corresponding to two photons with opposite direction, $s = 1 – 1 = 0$. In both cases the corresponding energy is $E = 2mc^2$, what constitutes a proof of everything argued previously, particularly in two very important points:

a) Electric charge of electrons turns out to be the physical important quantity and not the mass, because it is the only parameter that distinguishes the particle from its antiparticle; mass can be considered as derived from

charge, so there is nothing to object for that being virtual and electromagnetic.

b) Mass awarded to photons is of the same nature of electrons and positrons, that is, virtual, so that we can avoid the problems of having to bemassless and at the same time inertial and gravitational.

c)
Moreover, the gauge particles of "weak interaction" acts in the nucleus or *inner space,* but the supposed neutrinos does not interact with those one as some author say; therefore it is **incorrect** to state that neutrinos only "feel" the weak force. Both phenomena occur in the same *inner space,* but they differ in:

1)The force or weak interaction is taking place thorugh a continuous exchange of bosons as a result of the transformation between protons and neutrons is reversible establishing a dynamical equilibrium, so that W^-, $W^+$and Z^o particles can not go out to the *exterior or ordinary space*; otherwise, it would be a catastrophe on account of their enormous energies.

2) Beta decay occurs when the proton-neutron transformation is irreversible, since as we have seen with the disappearance of a neutron or proton, on account of the electron or positron' s departure, for which the only influence of neutrinos or antineutrinos is respect its orientation but not in their energy content. This is because is a "casual" fact, that is, it will only happens when there was some instability in certain atomic nuclei, either by excess of neutrons or protons. To associate a particle to the values of isospin contained in $Q = t_3 + Y/2$ as we have done, is merely a mathematical device, since the formula has been introduced to try to explain the charge of particles adjusted to Symmetry Group   SU(2) for electrons and positrons, in the same way it have been applied   SU(3) Group for the quarks' charge. Therefore, neutrinos cease to be significant and its inclusion in a new Standard Model would be unnecessary; in that case, now we can dispense with the assymmetric classification of Elementary Particles in two families: a) "doublets" which includes neutrinos; b) "singlets" that it excludes these together on with the corresponding mathematical apparatus. Likewise, we can also avoid the concept of "helicity" (spin for zero mass particle), because photons are equipped with a virtual mass. With the concept of virtual mass is no surprise that most of hadrons had a far big mass to that of nucleons, as it already get some of the quarks. Theses masses are actually energies, with which it may possible understand the existence of particles in the high energy's study. (our article: "Mass and Quantum Theory". The distinction between real or inertial mass for composite particles and the virtual and electromagnetic for the elementary one, we believe it is the right criterion for understanding the behaviour of all physics particle of the Universe in both its microscopic and macroscopic dimensión

7. CONCLUSION

We Have conducted a close and thoroughly examination of Relativity Theory, showing what you get with is the union of Electromagnetism and Quantum Theory, excluding Classics MechanicsContrary to what one might think, the existence of an only kind of mass leads to confusion and

contradictory concepts, while those are clarified with the establishing of two types of mass: a) real or inertial, whose origin is in nucleons or composite particles subjected to the laws of Classical Mechanics and Gravitation; b) virtual, whose origin is in the charges and with which we can get into the complex theoretical fabric of Quantum Field Theory. Otherwise, how can we accept the important energy formula, $E = mc^2$ for m real or inertial, being this is related to electromagnetic and wave parameter as it is indicated by (5)?. Besides, the mass variability is what it allows the accessibility to high energies and those can only be conceived through its electromagnetic and virtual nature, which may also get the particles involved in strong and weak and electromagnetic interactions. We clarified the trouble about photons due to its mass, ascribing it virtual nature in the same way that electrons; how else could we understand the so-called Compton effect and other known processes expressed by Feynman Graphs?. We have study beta decay phenomenon, questioning the existence of neutrinos that carry on an unnecessary complication: the energy balance was made precipitously in 1931, as befits those turbulent years, since it analyzes the energy of electrons as if they were classics particles, that is, individual and with perfectly defined kinetic energy and not like multiparticles as required by Quantum Theory. The experimental evidence of neutrinos are practically nil; whithout them it is possible to undertake the contruction of a new Standard Model, which it will be easier and affordable. The high energies involved in physics particles, elementary or not, subjected to Quantum Theory, is due to their virtual and electromagnetic mass contained in relativistic formula mc^2, while the material world in its dual aspect animated and inanimated owes its existence to a much smaller energy involved, since their actual masses are constants and governed by the laws of Classical Mechanis and Chemistry. Finally, if we extend the precedent analysis Cosmological Model, might clarify some of the mysteries concerning to dark mass, dark energy, black holes, etc. (our work: "Universe: an expansion Model?")

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