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The Mechanics of Neutrinos Creation in the 3-Spaces Model

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Abstract:- This paper lays out the mechanics of neutrino/antineutrino pair emissions in the 3-spaces model for the electron, muon and tau particles.

Keywords:- Neutrino, antineutrino, neutron, proton, electron, muon, tau, 3-spaces

I. THE ORIGINS OF THE CONCEPT OF NEUTRINOS

The neutron is a complex particle experimentally proven to be made up of 3 scatterable elementary charged particles ([8]) translating on closed orbits at near light speed, namely, one up quark and two down quarks, closed orbits that define the measurable diameter of the neutron. When associated to protons in atomic nuclei, neutrons are known to be just as stable as protons except in a few unstable isotopes. Stability here implies that unless destructively scattered by collision with some other particle, a particle so qualified is deemed to have an unlimited life span.

When isolated however, the neutron is also known to be unstable with a half-life of about 16.88 minutes, ending in a spontaneous decay process named **β-** decay, causing it to convert to one electron, which is an elementary particle, and a proton which is a complex particle proven to be made up of 3 scatterable elementary particles just like the neutron, but with a different mix, that is one down quark and two up quarks moving on closed orbits at near light speed, closed orbits that define the measurable diameter of the proton.

It is well documented since the early 1920's that part of the energy of a decaying free moving neutron seems to completely vanish when it decays into a proton and an electron, meaning that the sum of the energies making up the measurable masses of the resulting electron and proton plus the energy sustaining the velocity of the escaping electron, is almost always less than the total energy making up the mass of the neutron before decay.

A seldom documented fact about decaying neutrons is that the amount of energy that track is lost of as they decay varies from case to case from zero in some cases to an absolute maximum for some others.

This loss is directly dependent on the velocity with which the electron escapes at the moment of decay. In some limit cases, the electron escapes with a velocity sufficient for no loss to be measurable while at the other end of the scale, the loss is maximized when the electron escapes with very low velocity.

Enrico Fermi proposed in 1934 the hypothesis that this unaccounted for energy could possibly be carried away by some new particle that could not yet be physically detected on account of it having no mass and no charge. Let us note here that for a particle to have no mass implies that it will move at the speed of light like the photon.

He suggested naming this still undetected particle "neutrino" and its antiparticle "antineutrino". An antineutrino would be the product of spontaneous **β-** decay of a neutron:

$$n \rightarrow p + e^{-} + \bar{\nu}_e \tag{1}$$

and a neutrino would be the product of **β+** decay of a proton:

$$p \rightarrow n + e^{+} + \nu_e \tag{2}$$

Let us mention that at that time, the variability of the loss at the level of each individual neutron decay occurrence seems not to have been considered determinant. Afterwards, limit cases for which no energy at all was lost apparently did not induce a re-questioning of the concept of the neutrino as a particle.

Let us mention here that part of the mass of muon and tau particles also seems to "disappear" in a similar manner as they decay, leaving behind an isolated electron as the only massive detectable end product besides possibly some gamma photons, the sum of whose energies never amounting to the initial mass of the particles before decay just as in the case of the case of neutron **β-** decay.

Two other neutrino/antineutrino "pairs" have thus been defined, one pair corresponding to muon decay, and a third pair corresponding to the tau particle decay. Muons for example, spontaneously suddenly convert to an electron after a mean lifetime of 2.21 E-6 second, an electron that continues on moving on the same trajectory as the initial muon while the remainder of the energy of the muon mass seems to completely disappear, presumably, according to Fermi's theory, as a pair of neutrino/antineutrino, a decay process traditionally represented by the following equations:

$$\mu^- \rightarrow e^- + \bar{\nu}_e + \nu_\mu \quad \text{and for the anti-muon} \quad \mu^+ \rightarrow e^+ + \nu_e + \bar{\nu}_\mu \tag{3}$$

We will not go into more detail at this point, except to mention that at first, electronic neutrinos were not considered interchangeable with muonic neutrinos, but the theory was eventually amended to include the conversion of muonic neutrinos to electronic neutrinos.

II. EXPERIMENTAL VERIFICATION OF THE EXISTENCE OF NEUTRINOS

Needless to say that since Pauli's hypothesis was published, no effort was spared trying to detect this new particle that was expected to be produced in large quantities by the Sun and other stars' internal nuclear processes as well as by man-made nuclear reactors.

The neutrino is by definition the most elusive and difficult to detect particle that can be, since it is theoretically estimated that as little as only one in 10 billion neutrinos stands a chance of interacting with another particle among the countless quantities expected to constantly be boring right through the Earth as if did not exist.

A. Stretching the definition of "direct detection"

Detection experiments met with such difficulties and lasted for so long with no result that the very definition of the phrase "direct detection" ended up being stretched from meaning exclusively "proof of existence by physical scattering" to also include "otherwise unexplainable probable effects". The theory could then be validated in light of this expanded definition, and proof of physical existence of the theoretical particle could be accepted even if no direct collision with scatterable particles seemed achievable.

So, in spite of the often stated assertion in the literature that neutrinos have been and still are "directly" detected, even after 80 years of research and experimentation, neutrinos have still not really been detected by colliding them with other scatterable particles in a directly verifiable manner. There is no doubt however that neutrino energy exists and can interact with other particles.

In 1956, the two experimentalists Frederick Reines and Clyde Cowan successfully forced the re-conversion of protons to neutron state with emission of positrons at the Savannah River nuclear reactor by forcing antineutrinos produced by muon decay to interact with protons:

$$\bar{\nu}_e + p \rightarrow n + e^+ \tag{4}$$

which is the reverse of the reaction proposed by Pauli (equation (1)).

The reality of the re-conversion cannot be doubted since the annihilation of the positrons produced as they met electrons, as well as gamma emissions that can be attributed only to the absorption of neutrons by cadmium nuclei, have irrefutably been detected ([1]).

It is clear that this experiment created the conditions required for protons to become artificially unstable, like neutrons naturally are when isolated. It was concluded, since this was predicted by Fermi's theory, that antineutrinos, undetectable through direct scattering and impossible to be stopped by the shielding used, had to have been emitted by the reactor, since this seemed to be the only possible explanation for such a conversion.

The account of the experiment shows that every precaution was taken to ascertain that no known radiation or particles coming from the reactor or from cosmic radiation could overcome the shielding used to prevent contamination of the target protons being uses (Hydrogen atom nuclei linked to oxygen atoms in water molecules). To insure the isolation of the 200 liters of water of the reservoir, the detector was located 11 meters away from the reactor and 12 meters underground.

Consequently, since theory as well as physical set up of the experiment seem to allow no other possibility, the Savannah River experiment is regarded in the community as confirming "direct detection" of antineutrinos in the now more extended sense of the expression.

B. All observed effects are associated to muon decay

There is no doubt that the energy associated to neutrinos is involved since the Savannah River reactor produces quantities of muons quickly decaying inside the reactor, and that the intensity of this muon decay process coincided with the intensity of the re-conversion process of protons to neutron state with production of positrons that was observed.

Since the Reines and Cowan experiments, increasingly more sophisticated equipment has been developed to try and detect neutrinos coming from the Sun and from cosmic radiation, but the results have always been disappointing, always producing rates of indirect detection far below what theory predicts, each result causing the theory to be modified to account for each new observation contradicting the previous state of the theory.

C. Electronic neutrinos have never been detected

All observations made to this day always involved muon decay. No "effect" whatsoever either direct or indirect other than its disappearance was ever observed relative to the "neutrinos" associated to neutron **β-** decay that was the object of Fermi's theory.

III. THE 3 SPACES DIMENSIONS AND 9 INNER SPATIAL DIMENSIONS

Before proceeding further, it is useful to reproduce here the complete set of dimensions required in the expanded Maxwellian 3-spaces geometry that was completely described and justified in previous paper ([3], Sections VII).

For coherence, we will identify normal, electrostatic and magnetostatic spaces as being X-space, Y-space and Z-space respectively. Within normal space, let us rename the three minor spatial dimensions: X-x, X-y and X-z and likewise, for electrostatic and magnetostatic spaces: Y-x, Y-y, Y-z and Z-x, Z-y, Z-z.

Let us assume furthermore that the minor x-axes of all three spaces are mutually parallel in a direction corresponding to the conventional direction of motion of energy in normal space in plane wave treatment. Of course, when x, y and z dimensions are being used without major axis prefixes, they will by default refer to the usual normal 3-D space x, y and z dimensions.

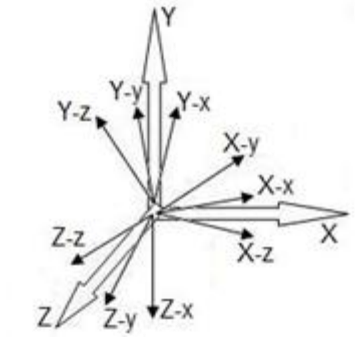

Fig.1: Orthogonal structure of the 3-spaces model.

Referring to the accompanying dimensions drawing (**Fig.1**), the reader is invited to remember the 3-ribs umbrella metaphor representing the opening from 0^o to 90^o of the inner dimensions of each space to allow easier visualization.

In this space geometry, electrostatic properties such as the Coulomb inverse square interaction with distance belongs to electrostatic space, while the magnetostatic inverse cube interaction, as analyzed in ([9]), belongs to magnetostatic space.

Free fall acceleration induced kinetic energy will appear massive to an observer located in normal space when it is in motion in either one of the other two spaces, but would locally be perceived as non-massive.

For example, as perceived from normal space, magnetostatic space and electrostatic space would be the realm of massive states, while normal space would be, as far as we observers located in this space are concerned, the realm of free fall acceleration induced unidirectional quantities of kinetic energy between bodies.

With the umbrella metaphor, it is easy now to visualize the three orthogonal spaces as three umbrellas meeting at their tips. We only need to mentally open any one of them to examine what is occurring in it at any given moment of the electromagnetic cycle.

IV. HOW TO STABILIZE THE NEUTRINOS THEORY

D. Comparing the internal structures of photon and electron

The first equation to be considered is the trispatial equation of a 1.022 MeV photon before decoupling (**[3], equation (16))**:

$$E\,\vec{\mathbf{I}}\,\vec{\mathbf{i}} = \left(\frac{hc}{2\lambda}\right)_X \vec{\mathbf{I}}\,\vec{\mathbf{i}} + \left[2\left(\frac{e^2}{4C}\right)_Y (\vec{\mathbf{J}}\,\vec{\mathbf{j}}, \vec{\mathbf{J}}\,\overleftarrow{\mathbf{j}})\cos^2(\omega t) + \left(\frac{L\ i^2}{2}\right)_Z \overleftrightarrow{\mathbf{K}}\sin^2(\omega t)\right] \tag{5}$$

This equation makes use of the less familiar energy inductance and capacitance that were required to clearly describe the dynamic internal structure of de Broglie's localized photon.

We will now replace the inductance and capacitance representations of equation (5) by the more familiar electric (**E**) and magnetic (**B**) fields expressions for energy. For a photon moving in straight line, it is well established that both electric and magnetic aspects of its internal dynamic structure have to be of equal density as described in ([4], equation (35)):

$$u_B = u_E = \frac{\mathbf{B}^2}{2\mu_0} = \frac{\varepsilon_0 \mathbf{E}^2}{2} \tag{6}$$

Given that energy density is an energy value divided by a volume, the fields expressions for a photon's oscillating electromagnetic energy can be recovered by multiplying these density expressions by the related integrated volume that this incompressible oscillating energy would occupy if it was immobilized into a sphere of isotropic density ([4], equation (40h)):

$$V = \frac{\alpha^5}{} \frac{\lambda^3}{2\pi^2} \tag{7}$$

giving:

$$E_E = \frac{\varepsilon_0 E^2}{2} V \qquad \text{and} \qquad E_B = \frac{B^2}{2\mu_0} V \tag{8}$$

which allows the following conversion of equation (5) to a more familiar fields expression:

$$E\,\vec{\mathbf{I}}\,\vec{\mathbf{i}} = \left(\frac{hc}{2\lambda}\right)_X \vec{\mathbf{I}}\,\vec{\mathbf{i}} + \left[2\left(\frac{\varepsilon_0 \mathbf{E}^2}{4}\right)_Y (\vec{\mathbf{J}}\,\vec{\mathbf{j}}, \vec{\mathbf{J}}\,\overleftarrow{\mathbf{j}})\cos^2(\omega t) + \left(\frac{\mathbf{B}^2}{2\mu_0}\right)_Z \overleftrightarrow{\mathbf{K}}\sin^2(\omega t)\right] V \tag{9}$$

where the electric field is expressed as:

$$\mathbf{E} = \frac{\pi e}{\varepsilon_0 \alpha^3 \lambda^2} \quad \text{from ([4], equation (40))} \tag{10}$$

and the magnetic field is expressed as:

$$\mathbf{B} = \frac{\pi \mu_0 e c}{\alpha^3 \lambda^2} \quad \text{from ([4], equation (34))} \tag{11}$$

Paper **([5], equation (29))** describes the corresponding fields related electron trispatial equation making use of the electron Compton wavelength as:

$$m_0\,\vec{\mathbf{0}} = \frac{V_m}{c^2}\left\{\left[\frac{\varepsilon_0 \mathbf{E}^2}{2}\right]_Y \vec{\mathbf{J}}\,\vec{\mathbf{i}} + \left[2\left(\frac{\varepsilon_0\,\mathbf{V}^2}{4}\right)_X (\vec{\mathbf{I}}\,\vec{\mathbf{j}}, \vec{\mathbf{I}}\,\overleftarrow{\mathbf{j}})\cos^2(\omega t) + \left(\frac{\mathbf{B}^2}{2\mu_0}\right)_Z \overleftrightarrow{\mathbf{K}}\sin^2(\omega t)\right]\right\} \tag{12}$$

Where $V_m = \frac{\alpha^5 \lambda_C{}^3}{2\pi^2}$, $E = \frac{\pi e}{\varepsilon_0 \alpha^3 \lambda_C{}^2}$, $B = \frac{\pi \mu_0 e c}{\alpha^3 \lambda_C{}^2}$ and $\mathbf{V} = \frac{\pi e}{\varepsilon_0 \alpha^3 \lambda_C{}^2}$

The **v** variable (Greek letter **nu**), representing what we will now name the ***neutrinic field***, for reasons that will become clear as we proceed, is defined with the exact same set of constants and wavelength as the corresponding photon electric field (Equation (10)) as analyzed in a separate paper ([5]).

Observing equation (9) describing the photon's dynamic internal structure, let us recall that the oscillating part of its energy cyclically oscillates between a state of single quantity in magnetostatic space (Z space) and a state of double quantities traveling in opposite directions in electrostatic space (Y space) where charges reside ([4]).

As described in ([5]), during the decoupling process of such a photon of energy 1.022 MeV, the unidirectional energy present in normal space (X-space) crosses over into electrostatic space (Y-space) while being divided into two equal unidirectional quantities then propelling the two Y-space half-photons in opposite directions on a closed orbit until they finally escape from their mutual attraction to become separate massive particles, one electron and one positron, each of which can be represented by equation (12) with a rest mass energy of 0.522 MeV.

While in equation (9) for a photon, we have two charges moving in opposite directions in electrostatic space (Y space) during their cyclic motion between this electrostatic space and magnetostatic space (Z-space), we can observe that in equation (12) for a massive electron, this electrostatic space is now occupied by a fixed quantity of unidirectional kinetic energy corresponding to the stable unit charge of the electron while the oscillating half of the electron's energy now cyclically oscillates between a state of a single quantity in magnetostatic space (Z-space) just like in photons (equation (9)), but in a state of double quantities now travelling in opposite directions within normal space (X space).

E. Identifying neutrinic energy

These two quantities now moving in normal space (X-space), that is 2 x ($\varepsilon_0 \mathbf{v}^2/4$) from equation (12), cannot have charges since charges belong by definition to electrostatic space (Y-space) in this model ([3], Section VII). They cannot show up as mass by very definition in the direction of motion of the electron in normal space, since they are moving on the X-y X-z plane within normal space, a plane perpendicular to the direction of motion of the electron in that space, since they are totally unaffected and insensitive to any force being applied in the direction of motion of the particle, a transverse insensitivity of unidirectional energy clearly demonstrated by Kaufmann's experiments as clarified in ([5], Section XXI) in correlation with paper ([3], Sections VII).

Let us now recall Fermi's hypothesis (**Section I** above) to the effect that neutrinos would be particles with neither charge nor mass. Haven't we just identified within the very structure of the electron two quantities of energy cyclically travelling in opposite directions that exactly match these criteria?

Could we then consider them to be particles? By similarity, we observe that these two quantities of energy travelling in opposite directions within the electron dynamic structure effectively correspond to the two de Broglie half-photons also moving in opposite directions within a photon. We saw also that these half-photons effectively become full-fledged particles only after decoupling occurs, freeing these half-photons to become a massive electron and a massive positron moving separately. It consequently seems problematic to outright name 'particles' these two quantities of energy as long as they remain within the dynamic structure of the electron.

How are we then to name these two half-quantities of energy that cyclically inhabit normal space perpendicularly to the direction of motion of the electron while remaining undetectable by structure since they are moving unidirectionally to and fro perpendicularly to the direction of motion?

It seems logical at this point to tentatively consider them as being potential ***neutrinic energy*** since they exactly correspond to the identification criteria given to neutrinos, and that only if some of this ***neutrinic energy*** found some way to escape and move separately could such escape possibly earn them the name of full-fledged neutrinos!

V. THE RELEASE OF NEUTRINIC ENERGY

The problem now is to comprehend how some of this neutrinic energy could mechanically escape to move as separate particles.

Experimental reality has shown after more than one century of experimentation that the electron has a totally stable rest mass and can under no circumstance lose any part of the energy that makes it up, since such a loss would automatically involve a lessening of its mass, which is known never to occur.

F. The release of electronic neutrinos

It is to be noted also that the possibility that this **β**- decay neutrino emission could obey the same release mechanism as the better documented muonic and tauic neutrino/antineutrino pairs release, seems not to have been explored. Such a release process would involve that during the initial stage of neutron **β**- decay, the disappearing neutrinic energy could first be carried away by the escaping electron as a momentary increase of the electron's rest mass energy or of its carrier-photon energy, to be released by the electron after it is ejected from the decaying neutron.

A momentary increase of the electron carrier-photon energy can be ruled out immediately since it is well verified that the velocity of the escaping electron does not suffer any sudden decrease after it escapes.

The only other remaining possibility then is that this excess neutrinic energy momentarily increases the rest mass energy of the electron.

If this is the case, we can immediately also rule out also the possibility that any of it could have entered electrostatic space (Y-space) to increase the stable unidirectional half of the electron rest mass energy, since such added energy introduction in electrostatic space would by structure increase the charge of the electron, and it is well established that the charge of the electron is totally invariant and has never been observed to vary in any way.

The only remaining possibility in the tri-spatial model then involves that this energy would momentarily increase the oscillating half of the electron's rest mass energy, that which alternates between normal space (X-space) and magnetostatic space (Z-space) in the first instants of electron separation, in a manner similar to such magnetic increase as occurs in the case of the magnetic drift due to closed circular orbital motion of particles ([6]), but without a corresponding energy decrease in electrostatic space (Y-space), since as mentioned already, the free moving electron charge has been extensively verified as being totally invariant.

Presently, such implication of a possibly drifted magnetic field due to a curved trajectory ([10]) in the initial moments of the escaping electron is totally consistent with the fact that the electron most probably escapes by spiralling out of the decaying neutron rather than by being ejected in a straight line. The mechanics of the electron escape during this first stage of neutron **β**- decay is analyzed in a separate paper.

Such inequality between the unidirectional electron rest mass energy occupying electrostatic space and the quantity oscillating between magnetostatic and normal spaces seems destabilizing by structure once the particle starts moving in straight line since such straight line motion is intimately tied to these two quantities being equal as analyzed in ([9]), which is likely to make the particle very sensitive to shed this excess energy at the slightest interaction with other particles.

So as not to overburden equation (13), as well as equation (16) representing the muon and tau internal dynamic structure, we will make do without the directed unit vectors superset, given that they are identical to those of the electron at rest (see equation (12)).

The trispatial equation of the **β**- decay escaping electron could then be amended with respect to stable electron rest mass equation (12) in the following manner:

$$m_{0+} = \left\{ \left[\frac{\varepsilon_0 \mathbf{E}^2}{2} \right]_Y + \left[2\left(\frac{\varepsilon_0 (\nu_e + \nu')^2}{4} \right)_X \cos^2(\omega t) + \left(\frac{(\mathbf{B}_e + \mathbf{B}')^2}{2\mu_0} \right)_Z \sin^2(\omega t) \right] \right\} \frac{V_m}{c^2} \tag{13}$$

Where $\mathbf{m_{0+}}$ represents the now slightly increased mass of the electron, and **v'** and **B'** represent the small additional quantity of energy that now momentarily oscillates between normal space and magnetostatic space in excess of the stable electron rest mass energy. As analyzed, the electron electric field **E** will remain unchanged.

So at the very beginning of the neutron decay process, as a first step of the process, the following equation would account for all of the neutron energy since the electron is momentarily carrying away all the energy not making up the rest mass of the residual proton:

$$n \rightarrow p + e'^{-} \tag{14}$$

Since this **β**- decay electron is slightly more energetic than its usual rest energy of 0.511 MeV, it seems then quite possible that as a function of the angle of its trajectory with respect to the neutron's three scatterable quarks in rotation at near light velocity, that it is in the process of leaving ([6], Section **19.2**), extreme destabilizing tensions due this initial proximity could, as a second step of the process, force the electron's two neutrinic energy quanta into a violent translational motion about the X-x axis that could then free the two supplementary half-quantities momentarily in excess, letting them escape into normal space in opposite directions while the two rest energy neutrinic quanta recover their usual to and fro oscillation, having then reached their lowest possible energy level.

$$e'^{-} \rightarrow e^{-} + \nu_e + \bar{\nu}_e \tag{15}$$

We will then have two identical quantities of kinetic energy moving unidirectionally in two opposite directions perpendicularly to the direction of motion of the mother electron, flying undetectable in normal space since they do not possess by structure the electromagnetic oscillating properties of the electron, which are the only properties that allow direct detection by scattering.

We now have a mechanically logical process mandating by structure that in reality electronic neutrinos could be emitted only in pairs in any process of **β-** decay, that is, a pair of electronic neutrino/antineutrino, which is a conclusion totally respecting the principle of symmetry:

What does experimental reality reveal in this regard?

To quote almost textually Théo Kahan, scientific director at the CNRS and author of the magnificent book "Les particules élémentaires" [(2), p. 78], *experience shows that the neutrino is different from the antineutrino. Neutrinos being longitudinally polarized, meaning that their spin is parallel or antiparallel to their motion, the antineutrino is an object rotating counter clockwise while the neutrino is an object rotating in the opposite direction about the impulsion vector*.

The only difference between neutrino and antineutrino is thus the direction of helicity about the direction of the velocity of neutrinos, a final state difference that seems to be accounted for by the liberation process that we have just analyzed.

G. The release of muonic and tauic neutrinos

Let us now examine the case of mu and tau particles, which of course also covers that of their antiparticles.

Let us use the muon to elaborate our analysis, the case of the tau particle being identical with a higher mass as the only difference.

It is solidly established that the charge of the muon (and of the tau particle) is identical to that of the electron. Its trispatial equation can thus be formulated as follows with respect to equation (12) for the electron:

$$m_\mu = \left\{ \left[\frac{\varepsilon_0 \mathbf{E}_e^{\,2}}{2} \right]_Y + \left[2\left(\frac{\varepsilon_0 (\nu_e + \nu_\mu)^2}{4} \right)_X \cos^2(\omega t) + \left(\frac{(\mathbf{B}_e + \mathbf{B}_\mu)^2}{2\mu_0} \right)_Z \sin^2(\omega t) \right] \right\} \frac{V_m}{c^2} \tag{16}$$

where $\mathbf{m_\mu}$ represents the muon rest mass, $\mathbf{v_\mu}$ and $\mathbf{B_\mu}$ represent the energy that the muon possesses in excess of that of the embedded electron energy $\mathbf{v_e}$ and $\mathbf{B_e}$ that cyclically oscillates between a state of two quantities of neutrinic energy in normal space (X-space), and a magnetic state in magnetostatic space (Z-space). On its part, the muon electric field $\mathbf{E_e}$ remains identical to that of the electron.

We observe that the muon still retains the same underlying trispatial structure as that of the electron (equation (12)), and that the excess neutrinic energy of the muon cyclically moves between Z- and X-spaces in precisely the same manner as that carried away by the electron in cases of **β-** decay.

A revealing telltale of the instability of this particle is the inequality between the quantity of unidirectional energy located in electrostatic space (Y-space) and the enormous quantity of energy that oscillates between the two other spaces, since the stability of the electron seems clearly tied to the fact that half of its energy occupies electrostatic space as a unidirectional quantity of kinetic energy on one hand, while on the other hand the other half of its energy cyclically oscillates between normal and magnetostatic spaces.

H. Neutrino emission perpendicular to the muon direction

This unbalanced internal distribution of the muon's energy in the 3-spaces structure can only render it very sensitive to be destabilized if it grazes some other particle while moving in straight line as previously analyzed, which would cause it to lose this neutrinic energy in excess in exactly the same manner as the electron in a neutron **β-** decay process. The embedded electron will then be freed to continue on its trajectory as experimentally observed.

Here also, logic imposes that two particles be released in opposite directions during any muon decay process, that is a pair muonic neutrino/antineutrino, which is a conclusion in agreement with the principle of symmetry:

$$\mu^- \rightarrow e^- + \bar{\nu}_\mu + \nu_\mu \quad \text{and} \quad \mu^+ \rightarrow e^+ + \nu_\mu + \bar{\nu}_\mu \qquad (17)$$

The fact that equal quantities of energy are releases in symmetrically opposite directions perpendicularly to the direction of motion of the decaying muon is the reason why the residual electron will carry on moving on the same trajectory as the initial muon since the recoils of both opposite emissions cancel each other out, barring deflection that could be caused by the destabilizing particle being grazed.

Could the fact that the neutrino/antineutrino pair is being ejected perpendicularly to the direction of motion of the decaying muon be the reason why the detectors pointed at the Sun detect only a fraction of the quantities of muonic neutrinos predicted in theory, since all neutrinos emitted by muons moving directly towards, or away from, the Earth have then no chance at all of being detected?

The decay of the tau particle is by structure identical to that of the muon, the neutrino/antineutrino pair being released being simply more energetic.

VI. WHY NEUTRINOS HAVE NO MASS AND NO CHARGE

The 3-spaces model muon internal structure shows that the difference between muonic neutrinos and electronic neutrinos is not one of nature, but simply of the amount of kinetic energy involved.

Experimental reality shows that the energy lost by muons and taus is not emitted as photons, which means that nothing causes the neutrinic energy quantities being released to forcibly slow down which would force their orthogonal re-quantization to convert them to normal photons and allow them to escape as such.

This also means that both members of each pair are identical and have permanently lost their electromagnetic nature as they fly in all directions as simple undetectable unidirectional quantities of kinetic energy in a process somehow reverse of that of induction of unidirectional kinetic energy by natural acceleration ([6], **Section 16.3**).

This would very simply explain why no clear mass nor any charge could ever be conclusively associated to neutrinos since in this trispatial model these characteristics can apply only to particles whose kinetic energy finds some internal equilibrium, whether stable or not, between the three spaces of this model about a trispatial junction, which obviously seems out of neutrinos' reach.

Since unidirectional kinetic energy is insensitive to any transverse interaction, this also means that no force can act on neutrinos to deflect them in any way and that this lack of interaction also means that even when a neutrino grazes another particle very close, this particle will not be affected nor deflected in any way.

With regards to longitudinal interactions however, let us remember the definition of electrodynamic inertia given earlier (**[5], Section B**) based on Kaufmann's findings and Poincare's interpretation, stating that "*the simplest definition of inertia would be that it is the resistance of unidirectional quantities of kinetic energy to being forced to slow down or accelerate*". We have seen on one hand that by very structure, what maintains the speed of light of a photon in this trispatial model is the fact that half of its energy (unidirectional) is forced to "carry", so to speak, an equal amount of energy in electromagnetic oscillation within two spaces perpendicular to the direction of motion (**[3]**).

On the other hand, we also analyzed how the inert energy of the mass of a massive particle adds to the orthogonally pulsating energy of its carrier-photon to slow it down, given the ratio offset in favour of the inert carried energy versus the unidirectional carrying energy of the carrier-photon (**[7]**).

It would seem then that since nothing longitudinally opposes the escaping neutrinic energy quanta to control their velocity, nothing either contradicts the possibility that they eventually may exceed the speed of light after they escape.

Experimental reality shows also that despite their total inability to interact transversally and their presumably point-like frontal cross section, some neutrinos obviously succeed stochastically in directly hitting other particles to which they then communicate their energy. In the case of protons, when the amount of energy communicated is sufficiently destabilizing, it has been observed that conversion to neutron state is initiated.

VII. CONCLUSION

Our analysis shows that in the 3-spaces model, all neutrinos and antineutrinos of each pair released are identical quantities of unidirectional kinetic energy released in opposite directions in normal space.

Furthermore, the only difference between electronic, neutrinic and tauic neutrinos and antineutrinos lies in the amount of unidirectional kinetic energy involved.

One major consequence of the mechanics of release of neutrino/antineutrino pairs in the 3-spaces model is that since they are released on a plane perpendicular to the direction of motion in space of the releasing particle, this conclusion may go a long way to explain why so few neutrinos have been observed by devices used to detect neutrinos coming from the Sun based on current theories.

Indeed, this release characteristic makes it impossible for all neutrinos/antineutrinos resulting from the decay muons coming from the Sun in the general direction of the detector to be detected since they are moving on planes perpendicular to the axis Sun-detector.

The only neutrinos/antineutrinos that can possibly be detected originating from the Sun's direction will be those released by decaying muons in motion on a plane perpendicular to the Sun-detector axis, which may be the reason why the detection rate has consistently remained so far below what current theory predicts.

REFERENCES

[1]. Frederick Reines and Clide L. Cowan, Jr., **Free Antineutrino Absorption Cross Section. I. Measurement of the Free Antineutrino Absorption Cross Section by Protons,** Physical Review, Volume 113, Number 1, Page 273-279. January 1, 1959.

[2]. Théo Kahan. **Les particules élémentaires**. Collection Que sais-je #1293, Presses Universitaires de France, 1969.

[3]. André Michaud**. The Expanded Maxwellian Space Geometry and the Photon Fundamental LC Equation**, International Journal of Engineering Research and Development, e-ISSN: 2278-067X, p-ISSN: 2278-800X, www.ijerd.com, Volume 6, Issue 8 (April 2013), PP. 31-45. (http://ijerd.com/paper/vol6-issue8/G06083145.pdf)**.**

[4]. André Michaud**. Field Equations for Localized Individual Photons and Relativistic Field Equations for Localized Moving Massive Particles**., International IFNA-ANS Journal, No. 2 (28), Vol. 13, 2007, p. 123-140, Kazan State University, Kazan, Russia (http://www.gsjournal.net/Science-Journals/Essays/View/2257).

[5]. André Michaud. **The Mechanics of Electron-Positron Pair Creation in the 3-Spaces Model**. International Journal of Engineering Research and Development, e-ISSN: 2278-067X, p-ISSN: 2278-800X, www.ijerd.com Volume 6, Issue 10 (April 2013), PP. 36-49. (http://ijerd.com/paper/vol6-issue10/F06103649.pdf).

[6]. André Michaud. **Expanded Maxwellian Geometry of Space.** 4th edition, SRP Books, 2004. Available in various eBook formats at: https://www.smashwords.com/books/view/163704.

[7]. André Michaud. **From Classical to Relativistic Mechanics via Maxwell**. International Journal of Engineering Research and Development, e-ISSN: 2278-067X, p-ISSN: 2278-800X, www.ijerd.com. Volume 6, Issue 4 (March 2013), PP. 01-10 (http://ijerd.com/paper/vol6-issue4/A06040110.swf)**.**

[8]. Breidenbach M. et al. (1969) **Observed Behavior of Highly Inelastic Electron-Proton Scattering**, Phys. Rev. Let., Vol. 23, No. 16, 935-939.

[9]. André Michaud. **On The Magnetostatic Inverse Cube Law and Magnetic Monopoles**. International Journal of Engineering Research and Development e-ISSN: 2278-067X, p-ISSN: 2278-800X, www.ijerd.com. Volume 7, Issue 5 (June 2013), PP.50-66. (http://www.ijerd.com/paper/vol7-issue5/H0705050066.pdf).

[10]. André Michaud. **On the Electron Magnetic Moment Anomaly**. International Journal of Engineering Research and Development. e-ISSN: 2278-067X, p-ISSN: 2278-800X, www.ijerd.com. Volume 7, Issue 3 (May 2013), PP. 21-25. (http://ijerd.com/paper/vol7-issue3/E0703021025.pdf).