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THE LAW OF ELECTRODYNAMICS:

ENERGY FINE STRUCTURE OF
THE INTERACTIONS OF MASSFREE AND MASSBOUND CHARGES

CHAPTER 3: FINE STRUCTURE AND COSMOGENIC CREATION
OF THE ELECTRON MASS-ENERGY

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ABSTRACT

Consistent with foundational physical data, we present a radically new electrodynamic model of a finite-size lepton mass-energy and its cosmogenesis, that does not conflate mass-energy with kinetic energy. At rest in its inertial frame, the electron forms a volumetric torus detailed by the fine-structure of its energy functions. From rest to motion up until $\beta = 0.7457$, the torus presents an electroinertial conformation at the Bohr scale (10^{-10} to 10^{-11} m). At higher values of β, the torus becomes increasingly deformed as it approaches the photoinertial conformation at the Compton scale (10^{-12} to 10^{-13} m). Lepton cosmogenesis arises from phase-energy processes of the 'vacuum medium' - here treated as forming a lattice of electric and massfree cells (the real "Planck particles") with modal energy of ~10^{-31} eV - by a double fold of three cells. *In vacuo*, the model ties together lepton cosmogenesis as the source of both the microwave background radiation and the spectrum of ultra-high-energy (UHE) cosmic ray primaries between 10^{15} and 10^{20} eV. Both are explained by the inversely-tied emissions of massfree charges (aka "ambipolons") that are freed from folded lattice cells.

3. Fine structure and cosmogenic creation of the electron mass-energy

Introduction

To this day, the conventionally established concept of the electron has remained that of a point-mass reducible to its "localization" by a probability wave. But over a century, there have been attempts at enunciating semi-classical and quantum theories that proposed a finite-size, volumetric structure for the electron. Before WWII, there was only one such model - Parson's ring electron (aka Parson magneton) - which was further elaborated by A. Compton and H. S. Allen. After WWII, most structural models became based on the quantum-electromagnetic paradigm of a *Zitterbewegung* of the Compton size, typically interpreted along P. Dirac's and R. Feynman's lines. They are collectively called Zitter models. Generally, they invoke a microscopic analogy (in the Bohr and Compton scales) of the observed macroscopic geometry of plasma objects (plasmoids, condensed plasmoids, charge clusters) and confine themselves to the relativistic de Broglie treatment of an electron mass-energy at rest that melds with the kinetic energy when the electron is accelerated to generate a "relativistic electromagnetic mass".

The *Zitterbewegung* paradigm postulates that the energy flux which defines the electron as a particle stems from its jittery interaction with a sea of *virtual and actual* photons in the "vacuum medium". It assumes there is a closed circulating motion of the electron's charge property (most models suggest this occurs around a center of mass). In 1953, K. Huang produced a semi-classical treatment of the Dirac equation [1] which proposed the *Zitterbewegung* as the cause of electron spin (angular moment, wrongly called momentum) which, in turn, would induce an electron "magnetic momentum" (also a moment). Zitter models privilege the role of the Compton scale (Compton wavelength or radius) in the volumetric elaboration of the electron energy flux, which they uniformly assume to consist of electromagnetic energy. Most incorporate a role for the classical electron radius, and invoke therefore some structure, usually spheroidal, that localizes either the charge, or the charge and the mass, at the Fermi/classical scale. Typically, the charge, or a spheroid of charge, is deemed to rotate around a ring or torus at the Compton radius and the speed of light. The Zitter models also claim to account for the $g/2$ factor (see below) and the Schwinger limit - which posits that, beyond it, massbound particles are

created by the self-interaction of light or electromagnetic fields that form two *counter-rotating* fluxes of "chiral light". Matter is just trapped light - the Uroboros of light.

In 1990, D. Hestenes suggested that the Zitter approach provided a new interpretation of the Dirac wave function [2]. Aetherometrically, this was a dead end - condemned to the development of an imperfect algebra that could not decipher what the actual wave functions were, whether electric or magnetic, whether they really belonged to the electron mass-energy or to any associated kinetic energy.

In 2002 and 2011 we presented our Aetherometric model of the electron mass-energy torus [3-4]. In contrast to the Zitter models, the aetherometric theory of the electron establishes from first principles the toroidal finite volume and fine structure of the electron mass-energy (at the Bohr to Compton scales), which it distinguishes from the different topo-geometric envelopes of the possible kinetic states of the electron.

The aetherometric model of the electron mass-energy describes a stable, compressible and deformable torus that flows through its loops at the velocity of its Coulomb potential, spins at the velocity of its standing magnetic wave, and varies between two limit conformations, electroinertial and photoinertial, as a function of captured kinetic energy. The electroinertial conformation relates the standard structure of the torus, whereas the photoinertial conformation denotes the most equatorially spread-out structure which an accelerated electron can reach before conservation of its mass-energy fails in favour of the instantaneous conversion into electromagnetic energy, typically by, but not limited to, the emission of two gamma photons.

The de-materialization of the electron mass-energy into electromagnetic energy has led physicists to assume that the nature of the intrinsic energy of the electron is electromagnetic. The aetherometric approach, both theoretical and experimental, indicates that nothing could be further from the physical facts. Only in the photoinertial conformation are the electric and magnetic wave functions of the mass-energy forcibly normalized to the speed of light c. Only then does the Compton scale come into play. The essence of the case can only be found in the contrasting physical properties of the electroinertial conformation: as we will formally demonstrate below, the wave function corresponding to the Coulomb potential of the electron mass-energy travels at a much greater velocity than c. The energy is *not* electromagnetic, but directly electric, right down to the Planck scale - a fact that we have unearthed in a previous communication [5]. As

succinctly presented below, this leads to a *phase-energy* treatment of the electron mass-energy, where the latter is created and maintained in time - along with its bound graviton energy and the modal kinetic energy responsible for the cosmic microwave heat bath (mCBR) - by the constant phase-energy flux of a massfree electric lattice (aka the "vacuum medium"), operating via a Planck-scale double-fold of the flux of three of its cells. The phase-energy process occurs at a minimum of 15 dimensions (E^3), where each of the three superimposed energy units resolves functionally to 5 elementary components: 3 wavelengths and 2 frequencies. It involves at any time not the addition of two virtual or actual photons, but a standing superimposition of at least three lattice "ambipolons" (charge-bearing particles of massfree energy).

The spectrum of cosmic ray primaries has been known for over 75 years, but their origin - whether galactic or extra-galactic - and physical nature remain speculative to this day. Initially conceptualized as an ultra-high-energy gamma-ray spectrum, the discovery of "fixed spectral features" (knee or knees, dip and rebound) has led to various approaches that have analyzed primary cosmic rays as combinations of different particles - such as extra-galactic protons and neutrons, elementary motes, relic neutrinos, and still others. But none of these approaches have been independently confirmed, as interpretation of the data depends on the chosen interaction model - all the more so as at these energy levels, no experimental basis can be adduced for any of the proposed models. Our model sugests that the cosmic ray spectrum is, instead, a direct outcome of the cosmogenic folding processes of the cosmic lattice, and that it is originally constituted by emission of freed ambipolons whenever a folding-knot is formed between distinct lattice cells. In this cosmogenic scenario, the initiation of the spectral knee occurs at 1.1 to $1.86*10^{15}$ eV and is explained by the creation of lepton mass-energies *in vacuo* that also possess the minima of kinetic energy responsible for the electromagnetic spectrum of the cosmic heat bath (microwave cosmic background radiation, mCBR). Similarly, cosmogenesis of protons *in vacuo* presents a radio background radiation (rCBR, with modal 142.7 m wavelength) with comparable minima of associated kinetic energy. We suggest that it is accompanied by the lattice-release of $8*10^{16}$ eV ambipolons. In contrast, cosmogenic production of either leptons or baryons created *without* associated kinetic energy is marked by the lattice-release of 10^{20}-10^{21} eV ambipolons. This occurs over the observed dip of the cosmic ray spectrum. Though the dip likely betrays a technical insufficiency (e.g. lack of sensitivity)

shared by the methods of cosmic ray detection, it nevertheless indicates that substantially more cosmogenic leptons are formed with associated kinetic energy (asymmetric process) than without (symmetric process).

1. The unacknowledged variety of kinetic energy envelopes

An exhaustive analysis of the diverse topo-geometries of kinetic energy envelopes is not our present focus. Their consideration is only relevant to the extent that we must differentiate between the flux topo-geometries ("spatial envelopes") of kinetic energy and the electron mass-energy because they are distinct, and because their articulation cannot be seized adequately if one persists in conflating mass-energy and kinetic energy, as any relativistic treatment of de Broglie Matter-Waves does. This is a methodological problem that affects all Zitter models of the electron.

Aetherometrically, the kinetic states ("kinetons") of the electron and their volumetric envelopes are many and variable. Each calls for a separate treatment. We will mention the most important:

1. A phase- or field-immobilized electron torus entirely juxtaposes any kinetic energy over its mass-energy [6], since "kinetons" are massfree. The volumetric constraint forces the torus as a whole to spin faster than its characteristic magnetic wavespeed. We note that this is one of the objective causes of the relativistic conflation of "rest mass" with "electromagnetic mass".

2. It suffices that the immobilization ceases being volumetric (e.g. becomes planar), for the kinetic energy to cause the torus to describe a tumbling rotation that may be precessionary, thereby generating a spheroidal envelope [4]. This is the objective cause of the idea of Bohr orbitals.

3. The *helicoidal* motion of the torus in ampere currents is performed *sideways, at an angle, to its magnetic field wave* on the surface of metals or track guides, with the rings of the torus acting like electric treads that roll over the "lines" of the electric field and repel other electrons, whether moving ahead or behind. Accordingly, macroscopic objects that present a toroidal structure (for ex. Bostick's plasmoids or so-called lightning-"balls" or fireballs, see below) are treated as macroscopic scopings of the motion of the microscopic electron structure that also present lateral displacement of the overall torus.

4. In contrast, the *helico-cycloidal* motion of the torus *in vacuo* under an applied electric field is made in the direction of its north pole for negatrons (and south pole for positrons), *orthogonally to its magnetic field wave*. This is exemplified by the plasma channels of auto-electronically emitted pulsed abnormal glow discharges (PAGD) or vacuum arcs, which present helico-tubular structures or vortical columns [7-8]. They result from the forward spinning and tunnelling motion of the electron plasma balls or helico-toroidal plasmas that are responsible for the circular cratering of cathodes at the emission sites. The retrograde motion of these electron plasma balls generates itinerant helicoidal tracks on thin-film cathodes of successive and neighbouring PAGD channels [7]. They are similar to the paths of cathode rays ejected by intense X-rays in Wilson chambers. Simple cylindrical models of these helicoidal plasmas have been proposed (for a review see [9]), but the topogeometry of the plasma flux is more complex than that, since the channels are helicoidal - and as the electrons spin forward along the helix, the helix itself is twisted - very much like Consa's helix on a helix paradigm (see below).

5. Gravitational acceleration of electrons presents *another kind* of *helico-cycloidal* motion (pendular form) where the torus rotates orthogonally to the plane of its magnetic field wave while swinging on a plane or helically [10-12] .

6. The aetherometric treatment of modified weak interactions [13] permitted experimental discovery of bilaminar plasmas [14] that also displace laterally a flux of coupled electron dyads.

7. Finally, energized ('excited') electrons can align their spinning magnetic fields to form planar clusters that can tumble together and cooperatively discharge kinetic energy in the form of ambipolon emission [15]. Charge lattices (as in capacitor plates or electroscopic leaf-stem systems) prevent this tumbling and attendant ambipolon emission, but decay slowly both by such emission and by emission of blackbody photons from single electrons.

Most importantly, we have shown that helico-cycloidal motion of the torus *in vacuo* is subject to an electric brake that does not invoke *any* relativistic constraints [16], but which, beyond a well-defined threshold of field and kinetic energies, progressively alters the *electroinertial conformation* of the electron torus, forcing it to spread out its equatorial dimension, until at the c-limit of the electron's velocity, it reaches the *photoinertial conformation* [4]. This treatment is succinctly addressed in section 4.2.

There is no occasion, in our view, to assimilate the varied topo-geometries of the kinetic energy envelopes to the topo-geometry of the electron mass-energy. In fact, we argue that such assimilation has been a prejudice, a built-in error that *ab initio* derailed a consistent treatment by the Zitter models of the electron mass-energy as a finite toroidal object.

2. Early finite-size models of the electron

The aetherometric theory of the electron mass-energy is not the first to propose that it has a *closed ring-like* structure. Though not cast in the form of a closed torus, A. Parson presented in 1915 a "ring electron" model [17] that was subsequently developed by A. Compton [18-19] and H.S. Allen [20] during 1917-1921. It postulated a continuous ring of negative electricity spinning rapidly around an axis perpendicular to its plane. It accounted for the diamagnetism of the electron as a permanent and not transient effect [19]. From X-ray scatter experiments, Compton concluded that the effective radius of the Parson magneton must be on the order of (10^{-12} m).

The model was never conventionally accepted, largely because it could not account for the anomalous Landé factor, or *g*-factor. The ring electron current was deemed to have a kink or hump that localized the particle's mass and travelled at c, with a radius equal to the Compton wavelength. However, how charge related to the ring flux remained unclear. If it was a property of the circular ring current, it had to be distributed "through a definite shape" [20], as some kind of a composite of infinitesimal charge elements.

Aetherometrically, the finite structure of the electron is not that of a ring, but of a rotating or spinning torus with an instantaneous and permanent electric energy flux flowing through a continuous closed series of loops (an helicoidal loop of loops). Likewise, as we will show below, the property of charge is directly a function of the magnetic spinning wave of the torus - not of an equatorial ring current, but of the speed of the standing wave that gyrates the whole torus - when the mass of the latter is taken into account. The Parson ring electron is the first model to mistake a loop of what we claim is the real electron torus, for the electron itself. But, despite the differing scales, there are many points of confluence between the ring electron and the aetherometric electron torus [21]. Most importantly, mass-energy is intrinsically conserved, since any loss of energy by radiation at rest is prevented by the constant rotation of a "ring charge" (see below).

Amongst other parallels, paramagnetism and X-ray diffraction patterns become explained by the tilting of the torus (confirming Allen's contention that the elementary magnet is formed not by the atom but by the electron). Seamlessly closing a ring or a torus also establishes the physical basis for conservation of "rest mass", i.e. mass-energy, since its flux is looped.

3. Errors of the Bostick model: nature of charge and the electron's coulomb potential

In 1956, W. Bostick reported the formation of coherent toroidal structures of plasma that he termed "plasmoids" [22]. By analogy, this inspired him to propose a toroidal-solenoid structure for the electron at rest, where it was now the *charge* of the electron (not the mass) that *travelled* at c through a closed helical path of many turns, to form a torus and contain the resulting magnetic flux.

Despite Bostick's model acknowledging a continuous closed path for "the charge flux" of the electron torus, he failed to realize not only the full length of the path, but that it was more than a path - that the sum of all the continuous "turns" ("sub-rings" or loops) define the mass-equivalent wavelength λ_e of the electron. It is this wavelength which encompasses the totality of the torus flux and displays the property of inertia. It is the whole torus energy flux that gyrates - as that wavelength is constantly rotated by a standing equatorial magnetic wave or wavespeed W_k. The latter is thus the same as the spin tangent velocity v_k of the torus itself [3-4]. Thus we arrive at the simplest physical and mathematical expression for the function of charge as *an electric momentum* - with the equality written in strictly equivalent traditional and aetherometric notations:

$$e = m_e v_k = \int = \lambda_e W_k = p_e$$

It states clearly that electric charge is the result *of* the closed loop of loops, the torus - or *of* the mass m_e that results from the coiling in loops of wavelength λ_e - rotating about its (unoccupied) center with the tangent velocity of its standing magnetic wave. The magnetic field wave is just *a component of the electric momentum*; charge is its momentum, so that there is no such thing as a separate magnetic momentum (only a magnetic angular moment, see below). Runge's rule that abstrusively related the magnetic effects of the

electron to the opaque ratio e/m is directly replaced by the magnetic wave function W_k of the electron torus, which is the real spin function of the whole torus. Since the wavelength of the magnetic field wave is easily determined from the quantum mass-energy of the electron -

$$E_{\delta e} = h\, \upsilon_{\delta e} = m_e\, c^2$$

- as

$$\lambda_h = p_e^2/(h\, \upsilon_{\delta e}) =\int= e^2/(h\, \upsilon_{\delta e}) = e^2/(m_e\, c^2)$$

- the magnetic field frequency ε_k (the real Bohr frequency) follows, so that the magnetic wave function W_k becomes:

$$W_k = p_e/\lambda_e = \lambda_h\, \varepsilon_k = \varepsilon_k\, p_e^2/(h\, \upsilon_{\delta e})$$

The radius ($\lambda_h/2\pi$) of the magnetic wave directly yields the Bohr 10^{-11} m scale. It has obviously been mistaken for a Bohr orbital in the hydrogen atom.

The magnetic wave gyrates the whole torus by flowing very nearly orthogonally to the wave flux of the loops (the voltage-electric wave, or wavespeed of the Coulomb potential of 511kV), which travels at a much greater speed than the speed of light [3-4, 21]:

$$V_x = m_e\, c^2/e = 511\text{kV} =\int= W_x = \lambda_e\, c^2/p_e = 3.53*10^{10}\ \text{m sec}^{-1}$$

Thereby, the energy flux is shown *not* to be electromagnetic. Bostick, in effect, could not ascertain the magnitudes or functions of the *two standing waves* (the wave-functions), magnetic and electric, that constitute the electron torus - any more than he could determine the number of "turns" (rings or loops) that form the torus.

In 1963, D. Ritchie analyzed the formation of lightning plasma balls, in nature and in the laboratory, and concluded that the ball was formed by a kink-instability that pinched a plasma column at two opposite ends to release a rotational plasma ring or doughnut [23]. Though he did not extend his plasma toroidal model to a model of the electron structure, he proposed a ring current that was intercepted orthogonally by magnetic lines of force or parallel loops. He had failed to realize that, just as it happens

with the actual electron torus, (1) the toroidal "rings" or loops are not the magnetic field lines, but rather the electric field lines or loops of the Coulomb potential; (2) the equatorial ring "current" of the torus is its real magnetic field wave, a standing wave that spins the torus; and (3) that it is around the rotating equatorial ring that a circulating plasma (or, rather, plasmas) form, and not in the middle hole of the doughnut, so to speak.

There are, of course, fundamental differences between the electron mass-energy torus and toroidal plasmoids. The energy flux of the torus comprises at once the electric wave flowing through each loop with the magnetic wave that spins the whole torus. Whereas in toroidal plasmoids the loops of the torus that define its electric field are formed by counter-rotating helicoidal plasma currents of electrons and positive ions that generate their own magnetic fields orthogonally to the direction of the currents. But it is still the equatorial gyration of the toroidal plasma as a whole that provides its (integral) magnetic field wave. Observers of ball-lightning often mention *a translucent or even a transparent core* - that 'they could see through its center' - which is strong evidence of its toroidal structure. Another peculiar trait of lightning-balls is their strange ability to move, in straight and curved paths, while floating and bobbing, and rather frequently ascending over obstacles (buildings, trees) as if they were weightless balloons that avoided obstacles. This suggests that the toroidal plasma moves by rolling at the rate of gyration of its equatorial magnetic field wave, using the current of the continuous loops of the torus as a kind of propelling electric tread.

4. The Zitter vs. Aetherometric models of the electron

4.1. Common aspects of Zitter models

Relativistic conflation of the electron mass-energy with its kinetic energy has led to wave-function solutions (quantum and semi-classical) of the electron finite-size and its motion that invoke unnecessarily complex mathematics which, in the case of the Zitter models, typically abide by a limited series of parameters:

1. Instead of localizing the electron *mass* in an imaginary point that rotates with the classical radius, they attribute this localization to the electron *charge*, even when they claim the charge is distributed over some volumetric space (typically a sphere on the Fermi/classical scale) that may be occupied by the mass.

2. They invoke the conventional value of the fine structure constant given by the arbitrary ratio of the classical radius to the radial vector of the Compton wavelength, whether the latter is modified or not.

3. They conceptualize the mote (of "relativistic mass") created by conflated mass-energy and kinetic energy as a singularity of an electromagnetic energy field formed either by a constellation of virtual photons or two actual photons.

4. The singularity consists of the charge moving at speed c through the proposed energy envelopes.

Generally, Zitter models invoke the Maxwell-Proca, de Broglie, Schrödinger, Aharonov-Bohm, Schwinger equations - under the umbrella of the *Zitterbewegung* paradigm. A recent self-published review by M. Fleury [24] aptly terms these models as The Zilch ("The nothing"-ness, or void), as per N. Lipkin's name for a source of chiral light. The term stands for notions that deny to the concept of massbound particles the discrete existence of mass or mass-energy, thereby claiming to reduce that concept to (the phenomenology of) a "pure electromagnetic field". Mass and charge are taken to be but mathematical formalisms devoid of ontological status. Fleury, amusingly, ends up by telling the simple shakespearan truth: "The Zilch-Zitter Electron may ultimately be a tale told by an idiot, full of sound and fury, signifying nothing."

4.2. The aetherometric model of the electron mass-energy and its critical differences towards Zitter models

Any simplistic model of the electron will stick to the notion that it displays a spherical energy-field distribution. Such is the case with a model recently proposed by Kovacs [25]. It supposes that the charge resides in a volumetric mass whose spherical radius is the imaginary classical electron radius r_e (~10^{-15} m) of the Classical/Fermi scale - since the latter is conventionally assumed to yield the scale at which the electron mass equals the electromagnetic field energy. Elsewhere, we have shown in detail how this is based on the deeply erroneous CGS equation for universal charge q -

$$q = \sqrt{(r_e\, m_e\, c^2)}$$

- which is off by more than 2 orders of magnitude from the lawful value of the elementary charge [26]. Moreover, as shown above, the charge property does not localize over a spherical point-mass, or inside of it - as if charge was a spheroidal particle with a Compton

radius, or rotating with that radius. Nor does mass localize on a point inside a sphere of charge, or on a spherical volume - since mass is simply the inertial expression of the loop-coiled wavelength λ_e of the whole electron torus.

The cycloidal spinning point-particle model of M. Rivas [27] assumes that the center of mass does not coincide with the center of charge. Bravely, it has no use for the classical radius, but retains relativistic dynamics to describe the motion of electrons in an electromagnetic field. The motion of the electron charge is treated as having a trochoidal path that becomes more curtate as the velocity approaches c. Most curiously, Rivas' theory of motion appears to be almost peeled off from our own theory of a regime of trochoid, prolate and curtate cycloidal waves deployed by (nonrelativistic) gravitational acceleration [10-12, 28]. From the aetherometric perspective, Rivas' major tenet is erroneous, since the center of the torus is the real center of charge, and also the abstract center of the mass defined by the torus wavelength - but not where the mass resides (since it "resides in" the totality of the continuous loops).

C. dos Santos attempted to describe the electron as a pure electromagnetic wave with the Compton radius, that forms a torus whose width has the arbitrary radius given by $(r_e/\sqrt{\pi})$ [29]. The *mass*, being determinant of the width of the torus, travels at c around the Compton torus. Fleury pointed out how this feature is paradoxical (it already was so in Parson's ring). The electric and magnetic field amplitudes of the torus are placed near those of the Schwinger limits. From the aetherometric perspective, the dos Santos model is tantamount to closing each loop of the *photoinertial conformation* of the electron mass-energy, and turning it into an electron by fashioning the isolated loop into a helicoidal torus. Indeed, if the energy flux is not *filigraine*, the thickness of each loop (not of the torus!) would have to be far smaller than a Compton diameter.

In 2017, O. Consa published a revision of his 2014 Bostick-inspired dynamic (read "unravelled") helical model of the electron [30] in favour of what he called a dynamic helical solenoid model [31]. He criticized Parson's ring and Bostick's toroidal-solenoid models for being static, closed structures. Just as an unravelled ring becomes a circular helix, an unravelled toroidal-solenoid becomes what he calls an helical solenoid, a helix on a helix. An electron moving with a constant velocity would form a continuous, open-ended, helical solenoid. Only at rest may it be thought of as appearing to form a torus. Consa, too, proposed that the charge of the electron rotates at the speed of light with a

radius given by the Compton wavelength. Under acceleration, the arc length of the helical motion would become equivalent to the circumference of the rotating ring at rest.

Consa interprets his model to imply that the *g*-factor cannot be measured beyond a maximum precision level since it naturally oscillates. Provocatively, this last trait rejoins our determination [4] of the two limits, maximum and minimum, of the anomalous *g*-factor (see discussion below). In effect, the "helical solenoid" motion that Consa presents only approaches the kinetic helico-cycloidal envelope of the motion of the torus *in vacuo*, as found for instance in arc plasma channels (see above). The collapse, at rest, of the "helical-solenoid" into a toroidal-solenoid approximates a notion of a mass-energy distinct from kinetic energy. But in reality, so we claim, the electron mass-energy is what forms the closed torus, whereas the kinetic energy only forms the distinct geometric envelopes of the displacement variants that are possible. They are geometrically and energetically distinct realities, even as they juxtapose (add). Moreover, Consa equally mistakes a single loop of the torus for the torus itself - except that, in his case, the mistaken loop can be "dynamically" closed or open.

In a 2024 paper that addresses "charge clusters" and their role in low-energy nuclear reactions, G. Vassallo proposed a "non-linear" *Zitterbewegung* model of the electron that, rather similarly to Consa's, describes how the charge property forms a planar ring when at rest, but develops helices when set in motion, with the open helicoidal path contracting with increasing velocity [32]. The radius varies inversely to the $\beta = v/c$ ratio, decreasing as v approaches c. The spherical flux that defines charge also rotates at the Compton frequency. Most provocatively, Vassallo proposes that "the current ring is generated by a *massless* charge that rotates at the speed of light" (our emphasis), with an orbit radius equal to "the reduced Compton wavelength". But 'it ain't here' that a massfree charge is to be found!! For, the charge of the electron *is massbound*, because it is the direct expression of the magnetic rotation of the whole λ_e torus.

Aetherometrically, the Vassallo model suffers from major errors common to other Zitter models. The *Compton frequency* is not the angular frequency of the rotation of charge, but the frequency of the electric wavespeed through the loops in either of the electron conformations (see below). Another common mistake is that of defining the Coulomb potential of the electron as being equal to charge divided by the hypothetical

Compton radius of the charge (notice that Vassallo now means the Compton radius and not a reduced Compton wavelength):

$$V = e/r_c$$

It is easy to demonstrate aetherometrically how this would result in a potential that would be 1,025x greater than 511kV. The actual potential is V_x and, if we are to express it as a function of a radius, it must be that of the radius r_x of each of the "turns" or loops of the torus - i.e. *the radius of the wavespeed* W_x *of potential* V_x [4]. This radius is a direct function of the unacknowledged Duane-Hunt wavelength λ_x given by -

$$\lambda_x = h/p_e = \int = h/e$$

- so that the Coulomb potential of the *standard electroinertial conformation* of the electron mass-energy is simply a function of the *Compton frequency* $\upsilon_{\delta e}$, which is the quantum frequency of the electron mass-energy [4]:

$$W_x = \lambda_x \upsilon_{\delta e} = 2\pi r_x \upsilon_{\delta e}$$

Note that r_x also specifies a Bohr scale of 10^{-11} m. Further note that if the wavespeed of the Coulomb potential was a function of the Compton wavelength, the resulting wavespeed would be that of light, not W_x:

$$c = \lambda_c \upsilon_{\delta e} = 2\pi r_c \upsilon_{\delta e}$$

That is exactly what happens when the electron mass-energy reaches the limit photoinertial conformation. More on this below.

To obtain the Coulomb potential from the electron charge, then, it suffices to divide the latter by the wavelength of the electron's magnetic wavespeed -

$$W_x = p_e/\lambda_h = p_e/2\pi r_h$$

- or to multiply charge by the more exact value ε_k of the so-called Bohr frequency, and then divide the product by the characteristic magnetic wavespeed W_k of the torus [4]:

$$V_x = \varepsilon_k\, e/W_k = e/\lambda_h = \int = W_x = \varepsilon_k\, p_e/W_k = p_e/\lambda_h = p_e/2\pi r_h$$

Follows the aetherometric master-equation for the mass-energy of the electron in both conformations [4]:

$$E_{\delta e} = h\, \upsilon_{\delta e} = m_e\, c^2 = m_e\, W_k\, W_x = \int = \lambda_e\, W_k\, W_x = \lambda_e\, c^2$$

where

$$c = \sqrt{(W_x\, W_k)}$$

and, in the *standard electroinertial conformation* :

$$W_k = c/(10\, \sqrt{\alpha^{-1}})$$

$$W_x = (10\, \sqrt{\alpha^{-1}})\, c$$

Note in passing (since it is not our topic), how this is distinct from the kinetic energy, which, up until accelerational velocities reach $\beta = 0.7457$, is a function of the wavespeed of the applied potential, W_v -

$$E_{Ke} = \lambda_e\, W_k\, W_v = p_e\, W_v = \lambda_e\, v^2$$

- and the linear velocity is simply given by

$$v = \sqrt{(W_k\, W_v)} = \beta\, c$$

Now, since the aetherometric electron torus is a deformable object, the radius r_x, or better, the radial vector of the electric wavespeed - and its corresponding wavelength - are *variable*. One can treat the *standard* conformation of the electron mass-energy *in vacuo* as unchanging until a specific linear velocity limit is reached. For a more comprehensive treatment of how this *non-relativistic* approach is an exact function of the proportion of kinetic energy to the mass-energy of the electron, the reader should consult [16]. In essence, the radius of the electric wavespeed responsible for the Coulomb potential of the electron mass-energy only reaches the Compton limit given by $\lambda_c/2\pi$ when a *photoinertial conformation* is forced by (1) the accelerational state of the electron torus, (2) an incident

beam of high energy, or (3) a high-energy inelastic collision. When substantially accelerated, the electron conserves its mass-energy by increasingly resisting absorption of field energy, as the electroinertial conformation changes toward the photoinertial conformation. The radius of the magnetic wave progressively increases just as the radius of the electric wave decreases - while their frequencies remain constant. Thus the equatorial diameter of the torus increases, while the diameter of the loops decreases. The result is that the magnetic wavespeed increases to the limit c while the electric wavespeed decreases to it. *At the limit*, when the photoinertial conformation is reached at the Compton-Dirac scale, the electron mass-energy becomes the energy of a photon -

$$E = h\,\upsilon_{\delta e} = m_e\,c^2 = \int = \lambda_e\,c^2$$

- where p_{Ae} is fully revealed as the inertial linear momentum of the electron mass-energy (and not as the integral linear momentum of its mass-energy *and* kinetic energy):

$$p_{Ae} = \lambda_e\,c = \lambda_e\,\lambda_c\,\upsilon_{\delta e}$$

It follows that once the electron torus reaches the photoinertial conformation, the Coulomb potential of the electron has become reduced to that of the wavespeed of light - which we have formally shown to be equivalent to 4.34kV, an not 511kV - because the electron mass-energy of 511keV has now become the 511keV energy of a massless gamma photon. The energy is the *same or conserved*, but the intrinsic Coulomb potential of mass-energy changes into the potential of a photon, as the torus energy unravels vortically.

Astonishingly, the proposed microfunctionalist algebra needed to understand the fine structure of the electron mass-energy and how it articulates with a variable kinetic energy is a simple one devoid of unnecessary mathematical frills that so jar and awe scientists and the lay public. It is only too human to overcomplexify the facts of nature. To avoid this, science has Occam's razor. So, the above aetherometric findings are also and effectively razor-cuts applicable as much to the Standard Model, as to the Zitter models of Bostick, Consa, Vassallo, Markoulakis & Antonidakis, etc.

Markoulakis & Antonidakis proposed another finite-size model of the electron, which they called "the 1/2 spin fiber model" [33]. They do not suggest a mass-energy flux that is continuous - but, once again, that the motion of the electron *charge* describes a many-turn twisted toroidal fiber (which they call "a charge manifold" formed by "a

coherent stream of *virtual* photons" in "vortexing motion"; our emphasis) that deploys "a sphericity of charge distribution which is not perfectly spherical" by a small deviation [33-34]. Instead of charge, they refer to "distributed charge" which, to save the concept from inconsistency with the conventional notion that like charges repel, is described as *only in time* forming a geometric flux or "manifold". This seemingly implies that the resulting geometric figures of the electron models do not describe actual objects - volumetric structures that at all times contain an energy flux and present definite physical properties.

Markoulakis & Antonidakis retain the officiating dogma of the electromagnetic nature of the energy flux intrinsic to the electron, going as far as venturing the 'commonly agreeable' possibility that the charge manifold may be formed by two "actual photons" that are counter-twisted in their spin. We can already discern the gymnastics that, at best, condemn the model to merely approximate what we have identified as the photoinertial conformation of the electron torus. As is routine in most Zitter models, Markoulakis & Antonidakis "hammer in" the accepted and deeply erroneous value of the reciprocal of the fine-structure constant (~137), in order to come up with their twisted, quasi-spheroidal toroidal fiber. Their procedure follows the semi-classical tenet -

$$(\lambda_c/2\pi)/r_e = \alpha^{-1} \approx 137$$

where the ratio of the Compton radius to the classical electron radius r_e yields the reciprocal of alpha - but modifies it such that alpha invokes the radius of a "reduced Compton-wavelength", while formally changing the physical meaning of r_e to signify "the radius of charge from the center of the manifold to the [its] equator" (seemingly geometrically inconsistent with the notion of the manifold being a distributed charge):

$$\alpha = r_e/(\lambda_{c\_redux}/2\pi) \approx 137^{-1}$$

Once again, we encounter the generic pitfall of many Zitter models - a persistence in "finding" structure, or substructure, at the Fermi/classical scale. For the classical electron radius r_e is merely a hypothetical term completely devoid of empirical and analytical proof, and once thought to be the radius of mass, not of charge. In effect, most Zitter models imagine that charge has r_e as the scale of its "pointness", and that it moves around a circle formed by the Compton radius. They are just describing the motion of a kink through a single torus loop! They mistake the tree for the forest.

More importantly, though, the real and aetherometric physical relation for alpha simply stems from the proportion between the mass-equivalent wavelength of the torus and the Duane-Hunt wavelength of its standard loops:

$$\lambda_e/\lambda_x = \lambda_e\, p_e/h = \alpha^{-2} = 19{,}205.9 = \int = m_e\, e/h$$

- making alpha equal the reciprocal of the square root of the product of mass and charge divided by Planck's constant! What could be simpler and more elegant on the part of nature?

The above expression directly gives the total number of loops that form the standard torus, and puts the value of the dimensionless alpha at [35-36] -

$$\alpha = \sqrt{(\lambda_x/\lambda_e)} = \sqrt{(\lambda_e\, p_e/h)^{-1}} = (138.5853745)^{-1} = \int = \sqrt{(h/m_e\, e)}$$

Thereby, in one fell swoop, it totally decimates the entirety of the Standard Model along with the Zilch-Zitter models.

Dirac once commented on the value of alpha: "From (...) fundamental constants one can construct a number that has no dimensions (...). That number is found by experiment to have the value 137, or something very close to 137. Now, there is no known reason why it should have this value rather than some other number. Various people have put forward ideas about it, but there is no accepted theory. (...) There will be a physics in the future that works when ($hc/2\pi e^2$) has the value 137, and that will not work when it has any other value." [37]

We took up the challenge to see whether Dirac is correct in predicting that a physics where "that number" is not 137, but close to it, such as 138, *cannot* work - by formally proving that it is a physics where "that number" *must be* 137 which actually *does not* work. In effect, Dirac's cherished expression for "this number"

$$hc/2\pi e^2 = \int = h\, c/2\pi p_e^2 = 0.9755*10^{-4}$$

gives a dimensionless number that is ~140,000x smaller than the reciprocal of alpha, so that any physics based on it is bound to be rather erroneous (such as mistaking a loop of

the electron torus for the electron). This, we take, is an analytical fact only emphasized by the aetherometric claim that the reciprocal of alpha is not ~137 but ~138!

As for the role of the Compton wavelength in the photoinertial conformation of the electron torus, its exact proportion relative to λ_e is (with the correct value of alpha):

$$\lambda_e/\lambda_c = 10\ \alpha^{-2.5} = 2.2609*10^6$$

which gives the *limit number* of the increasingly compressed loops of that conformation. One cannot hammer this proportionality falsely, nor replace it with the false equation

$$\lambda_c/2\pi r_e = \lambda\!\!\!^{-}_c/r_e = \alpha^{-1}$$

which not even Markoulakis & Antonidakis can save by turning r_e into the radius of "the horn tube of [an] electron".

Accordingly, the photoinertial conformation of the electron torus twists and compresses the loops until at the limit there are 117.7x more loops than in the electroinertial conformation:

$$\lambda_e/\lambda_c = (10\ \sqrt{\alpha^{-1}})(\lambda_e/\lambda_x) = \eta\ \alpha^{-2}$$

where η is the Correa-eta constant,

$$\eta = 10\ \sqrt{\alpha^{-1}} = 117.7222895...$$

Each of the loops of the electroinertial conformation is twisted into 117.7 loops of the photoinertial conformation. By suggesting that the Compton radius is the equatorial radius of the electron "manifold", Markoulakis & Antonidakis miss entirely the fact that it is *only the radial vector* of each and every one of the torus loops - of their standing electric wave, *when travelling at* c *in the photoinertial conformation*. As for the equatorial radius of the real photoinertial torus - it is much, much greater that the Compton radius (some 19,207x), when the electron reaches its spread-out limit:

$$\lambda\!\!\!^{-}_c + (\alpha^{-2}\ \lambda\!\!\!^{-}_c)$$

This variation of the equatorial radius of the torus is pregnant with consequences. Bohren has produced evidence that a particle's target area varies with the nature of the

incident energy excitation [38]. Incident UV light on metallic ions appeared to have the effect of converging "the field lines of the [electromagnetic] Poynting vector" to produce anomalously intense energy absorption, which he attributed to the action of induced "surface plasmons"; and IR light incident on dielectric particles produced equally anomalous energy absorption, which he attributed to the action of induced "surface phonons". The effect may well simply be the result of the varying surface area presented by the outer electrons of atoms and molecules either under acceleration or when *resonantly targeted* by *directed* field energy.

If we just consider the isolated electron in a vacuum accelerator, it is not until the electron has acquired >284 keV of energy that the electroinertial conformation begins morphing towards the photoinertial conformation [16]. This occurs while the proportion of the input field energy E_{in} to the retained kinetic energy E_k is

$$E_{in}/E_k = (\beta^2 \Upsilon)^{-1} > 1$$

where β is v/c (and v a translational speed), and Υ is the proportionality between the input energy (including the exponentially growing energy E_R that is rejected by the electron mass-energy) and the electron mass-energy, $E_{\delta e}$, such that:

$$\Upsilon^{-1} = E_{in}/E_{\delta e} = (E_k + E_R)/E_{\delta e} = (E_T + E_R)/2E_{\delta e}$$

(where $E_T = E_{\delta e} + E_k$) and

$$(\beta^2 \Upsilon)^{-1} = E_{in}/(E_{\delta e}\, \beta^2)$$

Accordingly, relativistic considerations are not necessary.

A parallel situation likely arises for electrons bound to atoms in molecules if they resonantly absorb sufficient energy to launch them into high-voltage kinetic energy states. In 2013, Ambroselli and Roychoudori [39] commented on the Bohren effect in ways that come at the encounter of Aetherometry. They proposed a universal complex tension field (CTF) that *preferentially directs* energy into *resonant* systems, both microscopically and macroscopically. To us, this suggests that resonant high-energy absorption by a covalent

electron is likely mediated by the near-instantaneous spreading out of the electroinertial conformation.

In our view, the Zilch-Zitter models suffer from a kind of fixation on the physical meaning and role of the Compton wavelength in electron structure. The problem was already inherent to Parson's ring electron, and is its legacy. It caused all Zitter models, at best, to unwittingly address only a loop of the photoinertial conformation of the electron torus but, accordingly, never reach the actual physical terms of that conformation, let alone the dynamic vistas of the *standard electroinertial conformation*. It also condemned them to forever see hidden photons, actual or virtual, mutually trapped inside the energy flux of the electron, which prevents the realization that the internal energy flux is *not electromagnetic*, but *electric*.

Finally, let us consider the Landé factor of the gyromagnetic ratio that conventionally is equal to

$g = 1+ (\alpha/2\pi) = 1.0011614...$

using Codata 2006 data (the Schwinger value). Because, erroneously, electron magnetism is taken to be monomagnetic and not diamagnetic, the factor is treated as $g/2$. Conventionally, the electron magnetic moment is thought to be the outcome of the orbital angular momentum, when it is instead a diamagnetic moment intrinsic to the electron mass-energy torus. In this respect, by melding the orbital motion with the horn tubes (fibers) of their electron torus, the model of Markoulakis and Antonidakis (and despite its erroneous attribution of a 1/2 spin value of $h/4\pi$ to their electron) is a bit of an exception since, *in the closest analogy to our own*, their toroidal electron has a closed geometry that permits attribution of opposite magnetic poles situated transversely to the equator of the "manifold". However, in this respect, our approach did away with the concept of spin such as it exists in modern physics. In effect, electron spin is nothing other than the result of the equatorially-standing magnetic wave of the electron mass-energy. The aetherometric *negatron* is diamagnetic and it is the orientation of the magnetic vector with respect to the direction of the *forward* motion that defines the electric *polarity* or 'spin value' of the massbound charge, such that from the top (north pole) the flux appears to rotate in one direction, and from the bottom (south pole) in the opposite direction (the *positron* is just the negatron's chiral structure). This fully explains why massbound charge is monopolar and diamagnetic - precluding the existence of magnetic monopoles (and thereby throwing

into question the entire edifice of QED, and other fictions - such as the existence of "magnetic energy"): it must be the relative orientation of the direction of magnetic spin or gyration with respect to forward motion in abstract space that determines the electric monopolarity, positive or negative, of the electron. There is then little sense, if any, in assuming that $(h/4\pi)$ has any significance in terms of the spin property of the electron.

Accordingly, the inertial angular moment of the whole electron torus is conserved across both conformations -

$$A_o = p_e \lambda\!\!\!^{-}_x = p_{Ae} \lambda\!\!\!^{-}_c = h/2\pi$$

- where p_{Ae} is the linear inertial momentum of the electron mass,

$$p_{Ae} = \lambda_e c = \lambda_e W_k \eta$$

In contrast, "the normal magnetic angular moment" in the electroinertial conformation would have to be given by a substructure of the inertial angular moment -

$$A_m = 2 \mu_B = p_e \lambda\!\!\!^{-}_x/\eta = p_e \lambda\!\!\!^{-}_c = h/(2\pi \eta)$$

so that the normal gyro-magnetic ratio is just $A_o/A_m = \eta$. In reality, this normal ratio is a concoction extrapolated from electromagnetic measurements of the electron that are made as it approaches the limit photoinertial conformation. Only in the latter conformation are the electroinertial loops with radius $\lambda\!\!\!^{-}_x$ replaced by loops with radius $\lambda\!\!\!^{-}_x/\eta = \lambda\!\!\!^{-}_c$, since there will be 117.7x more loops in the torus. It is the expression

$$A_m = p_e \lambda\!\!\!^{-}_c$$

which deranged the Zitter approach because it appears to suggest a charge rotating with the Compton radius (with the additional problem of the conventional value of $A_m = \mu_B$), whereas in fact it describes a limiting magnetic moment condition - when one of the electroinertial loops comes to correspond to 117.7 photoinertial loops. But, as long as the electron mass-energy remains as such, it is always and already the so-called orbital moment that is the real magnetic and spin moment of the whole torus. It is *only* when measured as "the anomalous gyro-magnetic moment" characteristic of the limit photoinertial conformation that the moment in question becomes directly expressible as a

function of the Compton radius *of each loop* - even as it never quite reaches it (let alone becomes reduced from it):

$$A_{ma} = g\ 2\ \mu_B = g\ p_e\ \lambda\!\!\!^{-}_c = g\ \lambda_e\ W_k\ c/2\pi\upsilon_{\delta e}$$

There is no reduced Compton wavelength or radius involved anywhere. They are loop limits that cannot be reached if the electron mass-energy is to be conserved [16]. Back in 2011, we formally showed that the anomalous factor *only* comes into play *in the photoinertial conformation* of the electron torus, at its maximal limit [4]:

$$g = \eta/[\eta - (10^3\ \alpha^{-1})] = 1.001179$$

Moreover, we suggested that with the aetherometric value of alpha, it likely oscillates between

$$1 + (\alpha/2\pi) = 1.001148$$

and the maximal value, with a mean of 1.0011635, very nearly the Codata/Schwinger value of 1.0011614. These are very slightly wider margins than the natural oscillation of *g* proposed by Consa - which, however, is based on the conventional value of alpha (along with his mistaking a loop of the photoinertial torus for the whole electron) and centers *g* at 1.0011607 [31].

If one has followed our arguments, one should not be astonished that so much remains erroneous in the Markoulakis & Antonidakis model of the electron [33-34], including the volumetric sizing of the toruses, the magnitude of the electron's internal magnetic flux, the treatment of the so-called anomalous (gyro)magnetic moment, the wavicle-type "integration" of the wave and particle functions of the electron mass-energy, the conflation of mass-energy and kinetic energy with unlocalizable photon energy, and the shared inability to realize that charge is not a travelling locus but the electric momentum of the electron mass-energy:

$$e = m_e\ v_k = m_e\ c^2/V_x = \int = p_e = \lambda_e\ W_k = \lambda_e\ c^2/W_x$$

This last error becomes exacerbated when Markoulakis & Antonidakis argue that the charge manifold adjusts its radius to become the twisted toroidal wave function of the outer satellite electrons of atomic hydrogen and helium-4, as shown in their figure 6 [34].

They entirely miss the point that the hydrogen nucleus, the single proton, is just trapped within a standard electron torus, whereas the two counter-spinning electrons of helium-4 are not set one over the other (as if mass could occupy the same volumetric space of another mass), but form the most basic stack of toruses whose structure it shares with molecular hydrogen. Atomic matter, whether on the outer scale of the atom or on its nuclear scale (unpublished work), is formed by electron toruses that are plastically deformed to fit some inside others, and stacked in particular ways.

5. The electron mass-energy torus as a product of lattice phase-energy folds

5.1. The cosmic heat bath as a marker of asymmetric electron creation

Most of the erroneous notions and false functions that have successively parasitized on physics since 1927 have their weak footing in a shared inability to ascertain the fine-structure and functions of the electron mass-energy - the first real element of matter - as purely toroidal properties. Yes, one may hold that rest mass or mass-energy forms a deformable "helico-toroidal ring", but even the "ring electron" theory was insufficient to construct and describe the mass-energy torus, fixated as it was on the Compton-Dirac scale, when not on the Classical-Fermi scale. Investigation of the fundamental dynamic topology and structure of the electron mass-energy was almost entirely abandoned. It took nearly a century until our aetherometric work fully identified the fine-structure of the electron as an object of *mass-energy* algebraically and geometrically distributed in the form of a stable torus of "looped Aether-electric energy", formed by superimposed standing electric and magnetic waves [4] and devoid of any internal subparticle structure. Already in 2002, we had presented the basic model of the electron torus in our Berlin lecture [3], and examined it further in 2004 [12], but the complete work was only published in 2011. More recently, G. Gryziecki summarized the core of our findings, and provided basic and exact metric conversions from the CGS and SI systems of units to the aetherometric (massfree) system of units [21].

Though closed, the electron mass-energy torus is not static in any sense - there is at all times a circularized continuous energy flux through the spinning torus' loops, whose *standard* number is fixed by a simple proportionality constant [3-4]: α^{-2}. Since the dimensionless number is not an integer, the kink formed by the shortened ring of the torus gives the *objective illusion* of localizing either the charge of the electron (the illusion of the

Zitter models), or its point-mass (the illusion of the Bohr model), or, still more richly, the locus where "the observational interference of the physicist sums up the condensation of a wave of probability distribution" (the illusion of the "complementarists") - according to the tastes of physicists and dominant epochal fads. All got it wrong - from our perspective. The charge is a property of the entire mass-energy, not a kink in a flux that travels around a helix or torus, even if localization of the electron has always been attributed to that kink (the objective source of the above illusions). And the mass, read "conserved inertial rest mass", is nothing other than the sum of all the looped rings or "turns" of the torus in any conformation - its very path length or, properly, mass-equivalent wavelength, *and not a kink either*. Moreover, as we have demonstrated and as inevitably results from our complete solution to the Landé *g*-factor [4], even though there is a relaxed *electroinertial conformation* of the electron torus that serves as *standard* (in gas and vacua), the electron torus is not rigid but *compressible* (which is what permits formation of liquid and solid phases of matter) and *deformable* with full conservation of its mass-energy. It can also adopt a "distended" *photoinertial conformation*. Only the latter deploys the Compton wavelength as limit. The deformability also permits, upon inelastic collisions, the spread-out torus to become twist-looped over itself many times and briefly form closed, conico-helicoidal structures [4]. Adoption of a photoinertial conformation mediates the destruction of the electron mass-energy, whether by positron annihilation, or by self-annihilation with a quantum of kinetic energy that has reached the magnitude of the electron mass-energy [16].

Though the few and rare attempts by academic physicists to understand the topo-geometry, fine-structure and energy functions of the electron are most laudable efforts in *basic* science, they have nevertheless failed squarely to describe a single electron. They have definitely intuited the geometric structure and properties of the electron (rest energy, charge, mass, angular momentum, quantum frequency, etc), even approached the geometry of a flux-torus, but they could not pin them down exactly in their correct scales, or functionally articulate their physical functions, settling instead for various "quantum-mechanical" approximations and "mistakes in identity" that invoke abstruse mathematics and "tricks of the tail".

As if the current miscomprehension of the nature of charge was not enough, nature itself compounded the problem by the fact that the electron, as an element of mass-

energy, only exists because of its *stabilization* in a cosmological (and ambipolar) *phase-energy continuum* by a complex superimposition with both a graviton energy flux [4, 11] and a continual energy flux from the massfree electric lattice of the "vacuum medium". As we shall now argue, the Planck-scale lattice is an ordered flow-structure, not a mere randomistic dispersion of electromagnetic energy, a *Zitterbewegung* - be it due to compensating oscillations between 'positive and negative energy states'. The cosmic ambipolons do not interact with matter at the Bohr to Compton scales, only at the Planck scale, when they fold (in the phase-energy continuum) to give rise to mass-energy and its associated graviton energy, which they maintain by a persistent knot of folded lattice cells.

Based upon pendulum experiments conducted at sea level [10-11, 40], a first approach to the phase-energy equation for the electron mass-energy presents it as part of a complex 10-D manifold that sustains the electron-graviton particle E_{Ge}. This describes a single fold of two putative massfree energy units - the "two faces of Janus", so to speak, that are marked below by straight parentheses and separated by the equality of energy conversion, ==>, as per:

$$[E_{\alpha e}^2 = p_e^2\, W_{\alpha e}^2 = (\lambda_e\, c\, W_{Ge})^2 = \lambda_e^4\, c^2\, f_e^2] \Longrightarrow$$
$$\Longrightarrow [E_{\delta e}\, E_{Ge} = (\lambda_e\, c^2)\, (\lambda_e\, W_{Ge}^{\ 2}) = (\lambda_e\, c^2)\, (\lambda_e^3\, f_e^2) = \lambda_e^4\, c^2\, f_e^2]$$

- where $W_{\alpha e}$ is the putative, very small Coulomb potential of the synchronously superimposed ambipolons with energy $E_{\alpha e}$; W_{Ge} is the wavespeed of the graviton flux (equal to $\lambda_e\, f_e$); and f_e is the gravito-acoustic free-swing frequency of the electron (the unit frequency of its graviton flux).

Before delving into the folding dynamics of the lattice cells, we must note that the electron mass-energy has other fundamental energy associations than just the superimposition with its graviton energy E_{Ge}, or its flux. The continuous flux of cosmic ambipolons is directly made manifest by the primary gravitational energy of all grains of matter [5]. Its fundamental expression is

$$E_{1°Ge} = m\, G$$

and in the case of the electron it is directly a Planck-scale production

$$E_{1°Ge} = [E_{\delta e}\, E_{Ge}\, G^2/(W_{Ge}^2\ c^2)]^{0.5} = \lambda_e\, G = \lambda_{Planck°}\, E_{Ge}/\lambda_e =$$
$$= \lambda_{Planck°}\, \lambda_e^2\, f_e^2 = \lambda_{Planck°}\, W_{Ge}^2$$

where the Planck wavelength of the lattice is also directly an *electric function* of the universal force constant G and the undisturbed lattice frequency $\varepsilon_{Latt°}$ of each of its cells:

$$\lambda_{Planck°} = G/(\lambda_e\, f_e^2) = (p_e/\varepsilon_{Latt°})^{0.5} = 1.1075*10^{-35}\ m$$

We note that $\lambda_{Planck°}$ may be as small as $1.1070*10^{-35}$ m [5]. Both the graviton energy and the electron mass-energy have exact and proportionate correspondences with this Planck-scale energy unit:

$$E_{Ge} = \lambda_e^3\, f_e^2 = E_{1°Ge}\, \lambda_e/\lambda_{Planck°}$$
$$E_{\delta e} = E_{1°Ge}\, c^2/G$$

If $E_{1°Ge}$ is also a putative element that belongs to a distinct energy flux of another superimposed cell, we may obtain a very different phase-energy expression, which this time must employ a more complex 15-D phase-energy manifold:

$$(E_{Ge1°})(E_{\alpha e}^2) \Longrightarrow (E_{Ge1°})\ (E_{\delta e}\, E_{Ge})$$

A similar situation arises with the creation of leptons endowed with kinetic energy minima. The photon product of this kinetic energy is evident from the heat bath of the cosmic background of microwave radiation. Over 24 years ago, we reported that the mCBR mode equaled [41]:

$$h\upsilon_{mode} = 4\, E_{\alpha e} = 16\ \mu eV$$

The main mode of the thermal bath indeed has an electromagnetic frequency υ_{mode} of 3.86 GHz. However, following the aetherometric discovery that the electromagnetic energy of an optothermal photon is

$$Q_{micro} = kT = h\upsilon = \lambda_o c^2$$

- where λ_o is the length of the photon's path (which is different from the wavelength of light [42]) - one is forced to conclude that the temperature of the mCBR mode lies at 0.185°K *and not* at the conventionally-assumed 2.73°K!

Aetherometrically, this photon energy immediately puts the modal kinetic energy of the cosmological electrons at

$$E_{Ke\_CBRmode} = \alpha^{-2}\, h\upsilon_{mode} = \alpha^{-2}\, 4\, E_{\alpha e} = 0.307 \text{ eV}$$

since each photon is generated by a single loop of the electron torus. Thus, the modal mCBR photons serve as markers for an electron kinetic energy distribution that arises from capture of the ambipolar energy $E_{\alpha CBOR}$

$$E_{\alpha CBOR} = 0.307 \text{ eV} = \alpha^{-2}\, 4\, E_{\alpha e} \Longrightarrow E_{Ke\_CBRmode} = 0.307 \text{ eV} \Longrightarrow$$
$$\Longrightarrow \alpha^{-2}\, h\upsilon_{mode} = \alpha^{-2}\, (16\ \mu\text{eV})$$

Accordingly, this finding also leads to a second, though distinct, phase-energy superimposition at 15-D:

$$(\alpha^{-2}\, 4)(E_{\alpha e}{}^3) \Longrightarrow (\alpha^{-2}\, 4\, E_{\alpha e})\, (E_{\delta e}\, E_{Ge})$$

Even though this expression and the previous 15-D one both describe a double-fold between massfree energy elements and its energy conversion result, the involved elements obviously remain putative. Furthermore, the applicability of the previous expression depends on how ambipolons with the low energy of $E_{\alpha CBOR}$ are released in the process of a cosmogenic superimposition (more on this below).

In the context of the proposed cosmogenic scenario, the existence of the mCBR means that, at some still undefined negative-pressure limit of the cosmic vacuum ("nequaquam vacuum"), the "vacuum-state" lattice undergoes a series of double-foldings that seed a kineticized gas of electrons - an *electron plasma* - and constantly regenerate that

kinetic energy at a given rate (it turns out this rate is clocked at a frequency numerically identical to ε_k [4]). The mCBR is just the electromagnetic marker of the cosmogenesis of this plasma in the cosmic vacuum. The observed distribution of the mCBR photon energy is not gaussian, but quasi-modal, since the electromagnetic peak of the thermal bath extends the modal spectrum to 0.307°K at 6.418 GHz - so that

$$h\upsilon_{CRI} = 4\ \alpha^{-1.5} *10^{-3}\ E_{\alpha e} = 25.137\ m^3\ sec^{-2} =\int= 26.05\ \mu eV$$

In our model, the modal plateau of the mCBR comprises the cryo-critical state boundary where the fluid-like and gas-like phases of the ambipolar Aether lattice must be in balance, since their modal intensities are comparable; thus, equivalent electromagnetic peaks are observed -

$$\alpha^{-1.5} *10^{-3}\ h\upsilon_{mode} <=> h\upsilon_{CRI}$$

The corresponding low-energy ambipolar flux responsible for the kinetic energy which cosmological electrons dissipate as heat in the critical mode is

$$E_{\alpha CRI} = 4\ \alpha^{-3.5} *10^{-3}\ \ E_{\alpha e} =\int= 0.5004\ eV$$

The lowest limit of the cosmological photon radiation in the heat bath appears to lie exactly at 0.0463 degrees kelvin [41]:

$$h\upsilon_{lim} =\int= E_{\alpha e} = 3.859\ m^3\ sec^{-2} =\int= 4\ \mu eV$$

It corresponds to a minimum of ambipolar energy

$$E_{\alpha lim} = \alpha^{-2}\ E_{\alpha e} =\int= \alpha^{-2}\ h\upsilon_{lim} = 0.0768\ eV$$

This minimum ensures that no absolute zero of temperature can anywhere in the cosmos be reached - below $E_{\alpha lim}$, the Aether lattice in the "cosmic vacuum" would become a solid phase. Thus, even calling the resulting $h\upsilon_{lim}$ - the minimal thermal energy of the cosmic

continuum - a "zero-point energy" is a misnomer, since there is no absolute zero of temperature because there is always, thermally, an electromagnetic energy that ultimately results from a minimum of ambipolar energy being constantly emitted from the cosmic lattice whenever an electron (together with its electron-graviton) has been asymmetrically created and is maintained. It is this minimum (or this complex of spectral minima) that ceaselessly regenerates the kinetic energy of cosmic electrons out of the flux of the lattice cells.

As stated already, the three superimposed massfree energy terms that source either of the two 15-D double-folds described above are putative terms, and not the ultimate Planck-scale energy elements that superimpose to generate the electron mass-energy. To grasp these latter elements, we must first understand what is an ambipolon.

5.2. Energy-ambipolons and power-ambipolons: lattice fine-structure

An ambipolon is a particle, but not in the classical sense of a massbound particle, nor in the quantum-mechanical sense of a quantum of action with an angular moment equal to $h/2\pi$. An ambipolon is a particle in two very different acceptions of the term, both of which are precluded by conventional physics, and yet define the *power condition* of every ambipolon:

1) It has an energy fine-structure that conveys a linear momentum, yet this momentum is not inertial but electric and massfree - an ambipolar charge with an associated wave that corresponds to its Coulomb potential; this is the concept of the "energy-ambipolon".

2) The energy fine-structure is not separable from the fine-structure of its flux; this is the concept of the "power ambipolon".

Any ambipolon, whether high- or low-energy, has a universal non-quantal electric fine-structure for its energy -

$$E_\alpha = \lambda_{y1}^3 \, \varepsilon_{MF}^2 = p_e \, \lambda_{y1} \, \varepsilon_{MF} = p_e \, W_{v\alpha}$$

where p_e is the universal charge constant, treated as a linear momentum. By definition, an ambipolar charge differs from monopolar (always massbound) charges, in that its polarity

(read spin in the direction of motion) is phase-variable. It also has an angular moment given by

$$A_\alpha = p_e \lambda_{y1}/2\pi \neq h/2\pi$$

The angular moment varies according to the magnitude of the energy-ambipolon.

Every power-ambipolon has a smooth fine-structure that is purely undulatory (the cubed superimposition of equivalent electric and magnetic wavespeeds) with a finite timeline:

$$P_\alpha = \lambda_{y1}^3 \, \varepsilon_{MF}^3 = p_e \, W_{v\alpha} \, \varepsilon_{MF} = W_{v\alpha}^3 = E_\alpha \, \varepsilon_{MF} = n \, E_\alpha \, sec^{-1}$$

A power-ambipolon comprises the seamless flux of n energy-ambipolons with a given rate. We may say that a power ambipolon is an ordered flux of a limited number of energy ambipolons which, in turn, can be conceptualized as ambipolon particles. The energy content of a power ambipolon can be exhausted in time, but any massbound charge can only absorb at one time a single quantity E_α (a single particle) from its flux. The smooth, continuous power deployment of massfree ambipolons is what permits the formation of seamless electric and magnetic fields - and thus enables the approximate treatment of such fields by classical electrodynamics. The latter, nevertheless, misses the twin facts: that any electric field deploys (must deploy) energy having a definite power to its flux, and that it is formed by the continuous wave displacement of massfree ambipolar charges.

Back in 2008 [5], we published our theory of the Aether lattice cells and their functional relationship with the universal force constant G. It identified the undisturbed Aether lattice energy as being distributed through ambipolar (massfree electric) cells, or the real massfree "Planck particles", each with an energy of ~10^{31} eV, equal to:

$$E_{Latt^\circ} = p_{e^\circ} (\lambda_{Planck^\circ} \, \varepsilon_{Latt^\circ}) = \lambda_{Planck^\circ}^3 \, \varepsilon_{Latt^\circ}^2 = 1.8263*10^{31} \text{ eV}$$

where, formally, p_{e° is the massfree *ambipolar* (electric) charge; λ_{Planck°, the undisturbed Planck (wave)length; and ε_{Latt° the modal frequency of the undisturbed lattice. The flux

of cosmic ambipolar energy serves as the ultimate foundation for a single universal Time clocking all energy forms and exchanges, and it has a defined frequency -

$$\varepsilon_{Latt^\circ} = 1.1389*10^{71}\ sec^{-1}$$

This puts the cosmic power-ambipolon of each cell at an overwhelming value for its modal energy flux

$$P_{LattMode} = P_{Latt^\circ} = p_{e^\circ}\ (\lambda_{Planck^\circ}\ \varepsilon_{Latt^\circ}{}^2) = 2.0058*10^{108}\ m^3\ sec^{-3} =$$
$$= E_{Latt^\circ}\ \varepsilon_{Latt^\circ} = 1.1389*10^{71}\ E_{Latt^\circ}\ sec^{-1} = 2.0799*10^{102}\ eV\ sec^{-1}$$

For the phase-energy process of a triple-cell knot, the flux of three Aether cells must enter into mutual superimposition, such that the ambipolar lattice must fold twice, in effect as the result of $(E_{Latt^\circ})^3$. A triple-cell knot implies a double fold. Likewise, such a double fold of Aether lattice cells applies to their synchronized flux, such that the total phase-energy flux is a function of $(P_{Latt^\circ})^3$.

5.3. Lattice ambipolar emission of primary cosmic rays as markers of symmetric and asymmetric mass-energy creation processes

We propose that just as the cosmic heat bath is a marker for the creation of electrons with minima of kinetic energy - and indirectly for a cosmic low-energy ambipolar radiation - so is the residual emission of ultra-high-energy ambipolons that sources all cosmic ray primaries a marker for the lattice double-folds that arise to create lepton (our current concern) and baryon masses.

Conventionally, the origin and nature of primary cosmic rays is extrapolated - by the constraints of interpretative models - from the fluxes of secondary particles, including elemental ones, detected in atmospheric air showers. Generally, electrons, protons and helions are treated as constituents of primaries - along with carbon, oxygen and iron (deemed of stellar and galactic origin). Antiprotons and positrons are mostly treated as secondaries, along with muons, hadrons and the low atomic weight elements, lithium and boron.

Based upon a conventional estimate of the average kinetic energy per nucleon on the order of $1.06*10^{10}$ eV, fluxes of elementary nuclei up until iron are supposed to explain the lower range of cosmic primaries that vanishes near 10^{15} eV. We contend this view results from an interpretive scheme - since, in our cosmogenic scenario, iron nuclei may not have more than ~$1*10^{11}$ eV of energy, and no spectral evidence of element condensations exists to confirm that scheme. Moreover, the first or original knee in the cosmic ray spectrum occurs near $2*10^{15}$ eV, where there is a marked change in the spectral index that has still not been adequately explained [43] - whether by supernova and pulsar mechanisms, propagation effects inside our Galaxy, or still by abstruse interactions with "relic neutrinos".

The reason why the average kinetic energy per nucleon is grossly overstated is simply that conventional particle physics continues to take the energy and voltage of an applied field to be the **kinetic** energy and the potential of a massbound charge accelerated by the field [16]. As we have shown, neither leptons, nor nucleons, can acquire a kinetic energy greater than their mass-energy and still conserve the latter [16]. Above, we provided already our non-relativistic analysis of the kinetic limits to field acceleration of electrons - and the same applies to all charged particles of matter. It follows that the nucleons of iron, which together have the mass-equivalence of ~100,000 electrons, can never acquire kinetic energy greater than $5.1*10^{10}$ eV. Near such maximum, the sum of its mass-energy and kinetic energy cannot exceed $1.02*10^{11}$ eV. This distinction between field energy and the modal kinetic energy of massbound charges exposed to a field is critical for, indeed, the tracks of the cosmic ray secondaries that are used to infer the primaries are calibrated by the applied field energy that is required to experimentally reproduce those tracks - and *not* by the actual kinetic energy of the accelerated particles (be it electrons, protons, muons or pions, etc) that produce them. Thus, at these tremendous energies above ~$5*10^{11}$ eV, only ambipolons (*massfree* charges) can exist - after all, in nature, they are the very physical conveyors of field energy. In this respect, our concern in the present communication is not the elemental interpretation of cosmic primaries in the range of 10^{11} eV to 10^{15} eV, but in the UHE range above 10^{15} eV - specifically in what concerns production of primaries associated with our theory of lepton cosmogenesis.

In the first or minor dip and the ankle (short plateau) that follows - i.e. from10^{18} eV to $4*10^{19}$ eV [44, 45] - the composition of primaries is mostly thought to consist of

protons and helions. This region (first dip and ankle) has been interpreted to be due to the energy losses from extragalactic UHE protons that are "inelastically" incurred when they interact with the mCBR to generate negatron-positron pairs [45]. It has been posited that half of this energy loss is transferred to the production of "cosmogenic neutrinos" with $>10^{18}$ eV [46]. The intensity of primaries would be suppressed because protons were destroyed by interaction with the mCBR - which is called the GZK process (after the authors of the 1966 papers by K. Greisen and by G. Zatsepin and V. Kuzmin). It would produce either charged pions and neutrons, or neutral pions and (low energy) protons, with the former pathway generating the neutrino flux.

Once again, our analysis proves that no protons may acquire such high energies - so the very first axiomatic assumption is illegitimate. Moreover, as we will show below, the lower intensity of primaries in this cosmic ray region (before the major dip), correlates (inversely to energy) with the lower intensity of the submodal bands in the mCBR spectrum - that is, with the cosmogenesis of leptons that are formed with submodal minima of associated kinetic energy. Lastly, we have provided two formal proofs that neutrinos are merely hypothetical constructs that are reverse-engineered by a flawed logic [47]. As we will show below, the relative rarity *in vacuo* of lepton cosmogenesis in pairs, triplets and aggregates, without associated kinetic energy, is what explains the major dip in intensity which begins near $2*10^{20}$ eV.

Any cosmological process of creation of massbound particles *in vacuo* is marked by *an energy subtraction* - via emission of ambipolar radiation - from the flux of the knotted lattice cells when mass-energy is created. The energy subtracted from the flux of the cosmic lattice cells is therefore variable according to the mass-energy product. The cosmogenic asymmetric creation of electrons with any of the kinetic energy minima of the mCBR spectrum releases energy-ambipolons in the ~10^{15} eV range, marking initiation of the knee of cosmic primaries. We may take the modal value of the mCBR to formally determine knee initiation at $1.857*10^{15}$ eV (see below). In parallel, cosmogenic creation of baryonic mass presents radio background radiation (rCBR) and is accompanied by lattice-release of $8*10^{16}$ eV ambipolons. The spectrum of primary cosmic rays spans upwardly to the end of the knee, with a dip at $1.4*10^{20}$ eV [43, 48-49]. Aetherometrically, this span ranges by (α^{-2} 4)-fold (more recently, it has been split into a first and a second knee, plus an ankle that ends at the major dip). Our model places cosmogenic production of either

leptons or baryons created *without* associated kinetic energy in the spectral range formed by the release of 10^{20}-10^{21} eV ambipolons. This occurs at the observed dip of the cosmic ray spectrum. It likely indicates that many more cosmogenic leptons and baryons *in vacuo* are formed with associated kinetic energy (asymmetric process) than without (symmetric process). Further, we propose that it is only at the tremendous energies above the dip that lattice-emission of freed ambipolons occurs when elementary mass is created - with a relative limit suggested to occur for creation of element 112 at $1.7*10^{23}$ eV [5]. Such processes are rare *in vacuo* - hence the depression in the intensity of the primaries above 10^{21} eV - but common in stellar and galactic-core fusion reactions (nucleosynthesis). We note, nevertheless, that above 10^{21} eV, detection of primary cosmic rays remains an unknown, as it is beyond present-day means.

Let us articulate these spectral characteristics of cosmic rays in the proposed cosmogenic scenario. Assuming the double-fold phase-energy superimposition at 15-D for the putative energy elements that include eventual production of the mCBR, as expressed above by -

$$(\alpha^{-2}\ 4)(E_{\alpha e}{}^3) \Longrightarrow (\alpha^{-2}\ 4\ E_{\alpha e})\ (E_{\delta e}\ E_{Ge})$$

- the required Planck-scale increase in the force-function G responsible for knotting together lattice cells is expressed by

$$\{[(\alpha^{-2}\ 4\ E_{\alpha e})(E_{\delta e}\ E_{Ge})]/(E_{Ge}\ E_{\alpha e}{}^2)\}\ G = (\alpha^{-2}\ 4)(128*10^9)\ G$$

where

$$(128*10^9) = E_{\delta e}/E_{\alpha e} = E_{\alpha e}/E_{Ge}$$

Once the Planck wavelength of the emitted ambipolon marker is determined by

$$\lambda_{\text{Plancke-CBOR}} = (\lambda_{\text{Planck}^\circ}/G)\ [G\ (E_{\alpha e}/E_{Ge})(4\alpha^{-2})] =$$
$$= [\lambda_{\text{Planck}^\circ}\ (E_{\alpha e}/E_{Ge})](4\alpha^{-2}) = [\lambda_{\text{Planck}^\circ}\ (E_{\delta e}/E_{\alpha e})](4\alpha^{-2}) =$$
$$= 1.0891*10^{-19}\ \text{m}$$

we obtain the frequency of the emission $\varepsilon_{\text{Latte-CBOR}}$ at

$$\varepsilon_{\text{Latte-CBOR}} = p_{e^\circ}/(\lambda_{\text{Plancke-CBOR}})^2 = 1.1779*10^{39}\ \text{sec}^{-1}$$

It follows that the energy $E_{Latte\text{-}CBOR}$ of any of the lattice-freed ambipolons that mark the asymmetric creation of electrons with a modal minimum of kinetic energy (that, in turn, is marked by the mode of the mCBR spectrum) has a main mode given by:

$$E_{Latte\text{-}CBOR} = p_{e^\circ} (\lambda_{Plancke\text{-}CBOR}\, \varepsilon_{Latte\text{-}CBOR})] =$$
$$= [(\alpha^{-2}\, 4)(128*10^9)\, G](p_{e^\circ}\, \varepsilon_{Latte\text{-}CBOR})/(\lambda_e\, f_e^2) =$$
$$= 1.8573*10^{15}\ eV$$

This, and the slightly lower energy primaries that will be associated with $E_{Latte\text{-}CBOR\_CRI}$, mark together the initiation of the primaries' spectral knee at 1.1 to $1.85*10^{15}$ eV. Thus, when the modal low-energy $E_{\alpha CBOR}$ production occurs and a lepton is created that acquires it as its own kinetic energy, one or more $E_{Latte\text{-}CBOR}$ ambipolons are released from the lattice.

A native lattice energy-ambipolon is numerically equivalent to nearly 10^{16} lattice-freed $E_{Latte\text{-}CBOR}$ energy-ambipolons:

$$E_{Latt^\circ} = (9.8*10^{15})\, E_{Latte\text{-}CBOR} = (4\alpha^{-2})(128*10^9)\ E_{Latte\text{-}CBOR}$$

but we suggest that only three $E_{Latte\text{-}CBOR}$ ambipolons are emitted per creation event of kineticized leptons - one per knotted cell. Thus, the creation of kineticized leptons *in vacuo* directly but inversely ties together the primaries' spectral knee and its upward span, to the production of the electromagnetic spectrum of the *cosmic heat bath* (mCBR).

In the absence of any low-energy $E_{\alpha CBOR}$ production, the double-fold takes a simpler form for the putative elements -

$$(E_{\alpha e}^3) \Longrightarrow E_{\alpha e}\, (E_{\delta e}\, E_{Ge})$$

A lesser increase is required in the force-function G that knots together the lattice cells:

$$[(E_{\alpha e}\, E_{\delta e}\, E_{Ge})/(E_{Ge}\, E_{\alpha e}^2)]\, G = [E_{\alpha e}^2\, /(E_{Ge}\, E_{\alpha e})]\, G = (128*10^9)\, G$$

and the Planck wavelength of the freed ambipolon marker becomes

$$\lambda_{Planck\_e} = \{(\lambda_{Planck°}/G)\ [G\ (E_{\alpha e}/E_{Ge})]\} = [\lambda_{Planck°}\ (E_{\alpha e}/E_{Ge})] =$$
$$= [\lambda_{Planck°}\ (E_{\delta e}/E_{\alpha e})] = 1.4176*10^{-24}\ m$$

It follows that the frequency of the freed ambipolon is now

$$\varepsilon_{Latt\_e} = p_{e°}/(\lambda_{Planck\_e})^2 = 6.9516*10^{48}\ sec^{-1}$$

and its increased energy is:

$$E_{Latt\_e} = p_{e°}\ (\lambda_{Planck\_e}\ \varepsilon_{Latt\_e})] = [(128*10^9)\ G](p_e\ \varepsilon_{Latt\_e})/(\ \lambda_e\ f_e^2) =$$
$$= 1.4269*10^{20}\ eV$$

This applies to the cosmogenesis of a lepton singlet, but such as it occurs symmetrically for pair-production by a rule of addition that we may summarize by -

$$2(E_{\alpha e}^3) \Longrightarrow 2[E_{\alpha e}\ (E_{\delta e}\ E_{Ge})]$$

- which rule equally applies to production of lepton triplets and higher-number groupings of pairs and triplets, where n is any integer >2:

$$n(E_{\alpha e}^3) \Longrightarrow n[E_{\alpha e}\ (E_{\delta e}\ E_{Ge})]$$

It is precisely at the energy level of E_{Latt_e} that the dip is observed in cosmic primaries. As we have said, that is because, though cosmogenic, this singlet process of lepton production occurs mostly in stars and galactic cores, evidently being a minor component of lepton cosmogenesis *in vacuo*. Thus, in essence, between the knee and the major dip, all cosmic primaries result from ambipolar emissions that mark the genesis of leptons with kinetic energy minima, until the dip occurs to mark by E_{Latt_e} emissions the genesis of leptons at rest. Note that E_{Latt_e} has definite proportionalities to the other energy elements, be they putative

$$E_{Latt\_e} = (\alpha^{-2.5}\ 10^{61})\ E_{1°Ge} = 8^{16}\ E_{\delta e} = (128*10^9)^2\ \ 8^{16}\ E_{Ge} = (128*10^9)\ 8^{16}\ E_{\alpha e}$$

- just as the native energy-ambipolon of the lattice has definite proportions to the E_{Latt_e} ambipolon -

$$E_{Latt^{o}} = (128*10^{9})\ E_{Latt\_e} = (128*10^{9})\ p_e\ (\lambda_{Planck\_e}\ \varepsilon_{Latt\_e})$$

Of course, this does not mean that an indefinite number of lattice emissions of freed ambipolons occurs when mass-energy is created - nor that, when created, such emissions will continue to mark the presence of mass-energy particles. Our approach suggests, instead, that only when mass-energy is created are three energy-ambipolons freed from the lattice. Thereafter, the knot in the passing lattice remains for as long as the created mass-energy is not destroyed, but no more UHE ambipolons are released from the knotted lattice cells.

Let us see in some detail how mass-energy is created 'at rest', i.e. with no additional kinetic energy. A cubed energy superimposition of native lattice cells is equivalent to a number of cubed superimpositions of the freed energy-ambipolons that mark the creation of the electron mass-energy. For production of freed E_{Latt_e} ambipolons, we have

$$(E_{Latt^{o}})^3 = (128*10^{9})^3\ (E_{Latt\_e})^3 =$$
$$= (128*10^{9})^3\ \{E_{Latt\_e}\}\ \{8^{16}\ (128*10^{9})\ E_{\alpha e}\}^2 =$$
$$= (128*10^{9})^3\ \{E_{Latt\_e}\}\ \{8^{16}\ E_{\delta e}\}\ \{8^{16}\ (128*10^{9})^2\ E_{Ge}\} =$$

At last, we *begin* to approach the ultimate terms of the minimal 15-D phase-energy continuum that creates and sustains the electron mass-energy. It results from the tremendous energy release from a double folding of the massfree energy of three ambipolar lattice cells (placed, in the equation below, inside key parentheses), which we can provisionally express as a corresponding series of energy conversions:

$$(E_{Latt^{o}})^3 \Longrightarrow (128*10^{9})^3\ (E_{Latt\_e})^3 \Longrightarrow$$
$$\Longrightarrow (128*10^{9})^3\ \{E_{Latt\_e}\}\ \{8^{16}\ (128*10^{9})\ E_{\alpha e}\}^2 \Longrightarrow$$
$$\Longrightarrow (128*10^{9})^3\ \{E_{Latt\_e}\}\ \{8^{16}\ E_{\delta e}\}\ \{8^{16}\ (128*10^{9})^2\ E_{Ge}\}$$

At the level of the segmented subcell, the 15-D energy conversion that creates the electron mass-energy becomes:

$$\{E_{Latt\_e}\}\ \{8^{16}\ (128*10^{9})\ E_{\alpha e}\}^2 \Longrightarrow \{E_{Latt\_e}\}\ \{8^{16}\ E_{\delta e}\}\ \{8^{16}\ (128*10^{9})^2\ E_{Ge}\}$$

But the term $\{E_{Latt\_e}\}$ - once the cubed superimposition of $(E_{Latt^{\circ}})^3$ is reduced - is not yet formally one of the freed ambipolons that will source cosmic ray primaries. First, we must understand that it stands for an equivalent number of the unit energy-ambipolons $E_{\alpha i}$ that are associated with both the creation and the continual maintenance of the electron mass-energy:

$$E_{Latt\_e} = 8^{16}\ E_{\alpha i}$$

The ambipolar energy term $E_{\alpha i}$ is in magnitude identical to that of the electron mass-energy, but presents a totally different fine-structure that does *not* abide by the quantum constant

$$E_{\alpha i} = p_e\ W_i = p_{e^{\circ}}\ (\lambda_h\ \varepsilon_i) = \int = E_{\delta e} = \int = (128*10^{9})\ E_{\alpha e}$$

since $h \neq (p_e\ \lambda_h)$. This is in keeping with the *functional difference in the fine structure* of massfree vs. massbound charge that we have identified. Comparing the ambipolon $E_{\alpha i}$ and the mass-energy $E_{\delta e}$, we obtain their functional and numerical equivalence, such that: the potential W_i is of the same magnitude as W_x, but differently fine-structured; and, likewise, the internal fine structure of charge is distinct:

$$E_{\alpha i} = p_{e^{\circ}}\ W_i = p_{e^{\circ}}\ (\lambda_h\ \varepsilon_i) = \lambda_h^3\ \varepsilon_i^2 = \int = E_{\delta e} = p_e\ W_x = p_e\ (\lambda_x\ \upsilon_{\delta e}) = \lambda_e\ (\lambda_h\ \varepsilon_k)\ (\lambda_x\ \upsilon_{\delta e})$$

Thus, note that the ambipolon electric frequency ε_i is not *the Compton frequency* - or a quantum frequency - but related to the Compton frequency by exactly:

$$\varepsilon_i = \upsilon_{\delta e}/(\alpha^{-1}\ 10^{-2})$$

It follows that for the end-process of the double-fold component given by $(E_{Latt\_e})^3$, we have

$$(E_{Latt\_e})^3 = \{8^{16}\ E_{\alpha i}\}\ \{8^{16}\ E_{\delta e}\}\ \{8^{16}\ (128*10^9)^2\ E_{Ge}\}$$

Given that the primary gravitational energy appears to be the result of opposing lattice impulses at the Planck scale, it likely arises from the spinor flux of the unit energy-ambipolons $E_{\alpha i}$ constantly passing through the donut hole of the electron mass-energy - as per the actual transformative equivalence

$$E_{\alpha i} = (\lambda_h/\lambda_{Planck^\circ})\ (W_x/W_{Ge})^2\ E_{1^\circ Ge} =$$
$$= (\pi^2\ \alpha^{-11}\ 10^1)\ [\alpha^{-1}\ (128*10^{10})^2]\ E_{1^\circ Ge} = (\pi^2\ \alpha^{-12}\ 10^3)(128*10^9)^2\ E_{1^\circ Ge}$$

Where, then, do the freed energy-ambipolons that source the cosmic ray primaries that mark *cosmogenesis of leptons at rest* originate? They are released directly, or subtracted, from the segregated energy of the folded lattice cell streams (i.e. from the phase-energy knot), once the energy of the final products ($E_{\alpha i}$, $E_{\delta e}$ and $(128*10^9)^2\ E_{Ge}$) *is also subtracted from each cell-based emission*. Accordingly, three freed - though superimposed - ambipolons with energy E_{Latt_e}, that mark solely the creation of leptonic mass-energy at rest, must be emitted as residuals from all three lattice cells. We can express this as

$$(E_{Latt^\circ})^3 = (128*10^9)^3\ (E_{Latt\_e})^3 =$$
$$= (128*10^9)^3\ [\{(8^{16}\ E_{\alpha i}) - E_{\alpha i}\}\ \{(8^{16}\ E_{\delta e}) - E_{\delta e}\}\ \{[8^{16}\ (128*10^9)^2\ E_{Ge}] - [(128*10^9)^2\ E_{Ge}]\}]$$

such that each freed energy-ambipolon out of the triple emission has the basic size of

$$E_{Latt\_e} = 8^{16}\ E_{\alpha i}\ - E_{\alpha i} = 8^{16}\ E_{\delta e} - E_{\delta e} \approx 8^{16}\ (128*10^9)^2\ E_{Ge}$$

A similar situation applies to the emission of $E_{Latte\text{-}CBOR}$ ambipolons, where

$$E_{Latte\text{-}CBOR} = [(\pi^2\ \alpha^{-4})\ E_{\alpha i}] - E_{\alpha i} = [(\pi^2\ \alpha^{-4})\ E_{\delta e}] - E_{\delta e} \approx (\pi^2\ \alpha^{-4})\ (128*10^9)^2\ E_{Ge}$$

This further suggests that, when kineticized leptons are generated, the modal $E_{\alpha CBOR}$ ambipolon is actually peeled off from the term $[(\pi^2\ \alpha^{-4})\ E_{\alpha i}]$ for one of the knotted lattice cells, so that the actual $E_{Latte\text{-}CBOR}$ mode is given by

$$E_{Latte\text{-}CBOR} = [(\pi^2\ \alpha^{-4})\ E_{\alpha i}] - (E_{\alpha i} + E_{\alpha CBOR}) =$$
$$= [(\pi^2\ \alpha^{-4})\ E_{\alpha i}] - \{E_{\alpha i} + [(\alpha^{-2}\ 4)\ E_{\alpha e}]\}$$

Once the electron mass-energy is created, the constant ultra-high speed flux of lattice cells through a superimposition knot regenerates both the spinor ambipolon $E_{\alpha i}$ and the flux of electron-gravitons.

The energy-ambipolons $E_{\alpha i}$ flow through the "empty" core of the mass-energy torus. The tubular structure of $E_{\alpha i}$ fits exactly through the donut hole of the torus. It provides an axle for the rotating torus, as it shares the same wavelength λ_h with the standard electron magnetic wavespeed, which it spins:

$$W_k = \lambda_h\ \varepsilon_k = \lambda_h\ \varepsilon_i/(\alpha^{-1}\ 10^2)$$

The ambipolon electric frequency ε_i is resonant with the magnetic wave frequency of the electron:

$$\varepsilon_i = \alpha^{-1}\ 10^2\ \varepsilon_k$$

and neither of them are quantum frequencies [50].

As we said, $E_{\alpha i}$ also encompasses the flux of the primary gravitational energy units that, absent a local gravitational field, oscillate up and down the axle with a cardioid trajectory, parallelly and antiparallelly to the magnetic vector of the electron torus (i.e. perpendicularly to the equatorial magnetic wave of the electron mass-energy). Since $E_{\alpha i}$ is a spinor, these primary gravitational impulses constantly precess their cardioid paths, each cardioid having a cusp directed to the abstract center of mass of the electron, which is the center of its torus and of the standing magnetic wave [4-5]. By occupying the circular core of the torus, $E_{\alpha i}$ (or, rather, its constant flux - whether its impulses are directional or direction-balanced) prevents it from contracting or collapsing.

Thus, by Occam's razor as applied to the determination of the electron fine structure and topo-geometry, an elegantly simple microfunctional algebra of energy superimposition in lepton cosmogenesis emerges that leads one to conclude that the electron mass-energy does not result from the *addition* of two "electromagnetic" energy units, be they actual photons or not - and certainly not just because gamma photons are released when the electron mass-energy is destroyed. Rather, it is created and sustained by the synchronous superimposed flux of at least *three massfree ambipolar energy units*, as formed by a double fold of cosmic lattice cells.

It is only the product $E_{\delta e}$ that can be converted into gamma-ray photons, if and when it acquires a kinetic energy equal to its mass-energy (we have encountered no instance of ambipolons converting directly into photons), or collides with a lepton of opposite charge. Then, both the graviton and the $E_{\alpha i}$ streams are released, and the knot formed by the double-fold unfolds, releasing the lattice cells - or, rather, their flux.

The three superimposed lattice ambipolons generate the electron mass-energy, the graviton-energy flux that holds that mass-energy flux together, and the energy-ambipolon that at any time occupies the core of the torus. Since the latter is also responsible for the flux of the corresponding primary gravitational energy units, all gravitational fluxes are thereby shown to be electrodynamic and ambipolar in nature. Without the cubed phase-energy superimposition, the electron toroidal flux of mass-energy would not have been created nor could be contained - and the electron would have neither inertia nor weight. Without it, the mass-energy torus of the electron would simply unravel, just as it does when a positron and a negatron inelastically collide to produce gamma-ray photons. The latter have no mass (no toroidal fine structure), nor associated graviton fluxes. We have, in fact, proposed that in contrast to mass-energy, the energy envelope and topo-geometry of photons is a vortical one [51].

Now we may begin to see just how far we had to come from the concepts of Maxwell, Lorenz and Planck, that took the fundamental field oscillators to be elements of electromagnetic energy - irrespective of whether these were treated as waves or quanta (photons). The entire variety of fundamental oscillators in nature are not electromagnetic, but ambipolar - electric but massfree. The most elementary of them are the lattice-cell ambipolons, which directly source the primaries of *cosmic radiation* proportionately to the double-foldings they engage into when creating mass-energy. Irrespective of resonant

photon absorption, electromagnetic energy is always a byproduct of the fundamental ambipolar interactions that create matter and lend it kinetic energy.

Most importantly, in the course of these investigations we discovered a universal gyro-gravitational moment μ_e of the Aether lattice, operating at a Planck scale as the property of each cosmic massfree (ambipolar) charge [5]:

$$\mu_e = p_{e^\circ} \lambda_{Planck^\circ} = \lambda_{Planck^\circ}{}^3 \varepsilon_{Latt^\circ}$$

or, expressed formally as an angular moment

$$\mu_e/2\pi = p_{e^\circ} \lambda_{y1}/2\pi$$

This led to a stunning realization - that what we call the magnetic wave function of the electron is actually the direct result of the universal gyro-gravitational moment μ_e, as constantly conveyed by the flux of $E_{\alpha i}$ ambipolons (along with their precessionary cardioid suboscillations). Massfree charge is a cosmological and ontological reality of the Aether lattice,

$$p_{e^\circ} = \mu_e/\lambda_{Planck^\circ}$$

that becomes translated by the electron mass-energy into massbound charge

$$p_{e^\circ} = \mu_e/\lambda_{Planck^\circ} \Longrightarrow \lambda_e W_k = p_e$$

so that the electron's standing magnetic wave that is directly spun by the flux of $E_{\alpha i}$ ambipolons is the lattice's very own doing:

$$W_k = \lambda_h \varepsilon_k = \lambda_h \varepsilon_i/(\alpha^{-1} 10^2) = \mu_e/(\lambda_{Planck^\circ} \lambda_e) = p_e/\lambda_e$$

It is the ambipolar-electric gyro-gravitational moment of the cosmic lattice that ultimately drives the standing magnetic wave of the electron mass-energy torus - not an electromagnetic *Zitterbewegung*.

When assembled together, these findings permitted direct expression of the universal force constant as a function of fundamental electron properties, relating the Bohr and Compton scales directly to the Planck scale:

$$G = \lambda_{Planck^\circ}\, \lambda_e\, f_e^2 = (E_{Latt^\circ}\, E_{Ge})/(p_e\, \varepsilon_{Latt^\circ}\, \lambda_e^2) = (E_{Latt^\circ}\, E_{Ge})/(W_k\, \varepsilon_{Latt^\circ}\, \lambda_e^3)$$

Discussion

Ambroselli and Roychoudori suggested that "the probably best known incarnation [of the CTF] corresponds to the luminiferous aether" of Maxwell [39]. But it is a weak correspondence or parallel, because Maxwellian electrodynamics is replete with profound errors [52-54]. In effect, though employing totally different mathematical treatments based on very different paradigms (including the ultimately electromagnetic nature of their proposed CTF), the CTF stands, or should stand, for the massfree electric Aether lattice itself. The proof for this statement lies in an adequate treatment of so-called "Planck particles".

Crothers and Dunning-Davis analyzed the existing treatments and assumptions of the "Planck particles" [55]. They quite rightly concluded that none are valid, thereby casting severe doubt on the existence of such particles. The basic conventional assertion is that the energy of a Planck particle is electromagnetic and massbound, being equal to

$$E_{Planck} = m_{Planck}\, c^2 \approx \sqrt{(h\, c^5/2\pi G)} \approx 10^{28}\ eV$$

with a "quantum" frequency of

$$\upsilon_{Planck} = \sqrt{(2\pi c^5/hG)} \approx 10^{43}\ sec^{-1}$$

There is no notion that such particles possess a charge property. And why should we assume they have mass? Quite to the point, Crothers and Dunning-Davis assert that "the alleged Planck particles would necessarily be point-masses, which are not only fictitious but also contradict the very meaning of the Compton wavelength" (as a limit, we might add in light of the present communication) - a fact we have gone over and over in the above. Indeed, and this is the very reason why we have not designated the ambipolar lattice cells as such "conventional" Planck particles per se: the ambipolar cells are *massfree and electric*, *not quantal nor point-masses that are electromagnetic*. As we proposed above, their undisturbed modal energy is

$$E_{Latt^\circ} = p_e\, (\lambda_{Planck^\circ}\, \varepsilon_{Latt^\circ}) = \lambda_{Planck^\circ}^3\, \varepsilon_{Latt^\circ}^2 = \mu_e\, \varepsilon_{Latt^\circ} = 2{*}10^{31}\ eV$$

with a non-quantum lattice frequency

$$\varepsilon_{Latt^o} = E_{Latt^o}/(p_e\, \lambda_{Planck^o}) = 1.189*10^{71}\ \ sec^{-1}$$

where the real Planck wavelength is

$$\lambda_{Planck^o} = G\ m^{-1}\ sec^2 = \mu_e/p_e = \sqrt{(p_{e^o}/\varepsilon_{Latt^o})} = 1.1075*10^{-35}\ m$$

For this reason, they do have a quantum equivalence, since the energy conversion yields:

$$\lambda_{Planck^o} = G\ m^{-1}\ sec^2 = \mu_e/p_e \Longrightarrow \lambda_x\, \mu_e/h = \mu_e/\lambda_e\, W_k$$

Unlike classical and quantum physics, Ambroselli and Roychoudori claim that the CTF is the only fundamental physical field that exists, and all else are perturbations of this field - particles such as the electron and the proton being "self-looped resonances of the tension field". However, merely intuiting this is far from figuring energy topo-geometries or fine structures. One has to abandon the very tenet that the fundamental energy of that field is electromagnetic - that Matter is the Uroboros of Light. For this, one would have to overcome the main problem that their theory faces - the same problem that confronts all Zitter theories: the fundamental field is ambipolar and massfree, and not electromagnetic. Light only exists on the surface of things, not within them. And the proof of the pudding lies in tasting it: no Zitter models have been able to *consistently* describe the mass-energy of even a single electron as a closed torus of a looped energy flux, nor as the result of the superimposition of a complex fundamental and massfree energy field - of its folding at a Planck scale.

We think that we have effectively delivered on this task of producing a consistent analytical description of the electron mass-energy, any kinetic energy it might acquire, and how it is created and sustained. Ultimately, it is not sufficient to just understand what the electron is and does - but it is one first giant stride towards understanding all else, including massfree charge and the electric and non-luminiferous nature of the lattice massfree Aether.

Appendix I - On physical systems of units and aetherometric equivalences

Aetherometry employs a new system of units with strict equivalences to the SI and CGS systems. In its system, all dimensionalities of physics, including mass, are reduced to the irreducible dimensions of length and time. Note that neither the units of the SI nor

those of CGS expressions for alpha have been maximally reduced, nor coincide with their simplest dimensionality. Moreover, with respect to alpha, it is far from clear, or a given, how in the CGS system statcoulomb^2 erg^{-1} cm^{-1} is a dimensionless expression, or likewise coulomb^2 F^{-1} J^{-1} in the SI system.

Aetherometric values employed:

$\lambda_e = m_e N_A 10^{-2}$ in meters = 5.485799*10^{-6} m, where m_e = 9.109389646*10^{-31} kg

1 eV =∫= 9.6485*10^5 m^3 sec^{-2}

$E_{\delta e}$ = 4.930*10^{11} m^3 sec^{-2} = $E_{\alpha i}$

$p_e = p_{e^o}$ = 13.9701765 m^2 sec^{-1}

W_k = 2.5466*10^6 m sec^{-1}

λ_h = 3.958*10^{-10} m

W_x = 3.529*10^{10} m sec^{-1}

λ_x = 2.856*10^{-10} m

h = 3.9903*10^{-9} m^3 sec^{-1}

p_{Ae} = 1.6446*10^3 m^2 sec^{-1}

λ_c = 2.426*10^{-12} m

η = 117.7222895

E_{Ge} = 3.009*10^{-11} m^3 sec^{-2}

$E_{\alpha e}$ = 3.852 m^3 sec^{-2}

E_{Latt^o} = 1.7612*10^{37} m^3 sec^{-2} =∫= 1.8263*10^{31} eV

ε_{Latt^o} = 1.1389*10^{71} sec^{-1}

μ_e = 1.5472*10^{-34} m^3 sec^{-1} ≈ [h (α^{-1} 10^{-2})]/[8^{16} (128*10^9)]

λ_q = 4.660*10^{-8} m

f_e = 426.9529 sec^{-1}

Appendix II - On adequate particle-wave integrations

The following expressions already integrate the wave and particle functions in all cases known to quantum physics - matter at rest, matter in motion, the photon, and *massbound* electric charge. There is no duality; there is an energy multiplicity that provides for the submicroscopic unity of processes afforded by the invariant quantum.

Hence, for mass-energy we can write two distinct "wave-particle multiplicities" that reveal, for example, the same electron: one for the *photoinertial properties* of rest-energy or mass-energy,

$$E_{\delta e} = m_e c^2 = \int = \begin{cases} \nearrow\ c = \lambda_c \upsilon_{\delta e} \\ \searrow\ p_{Ae} c \end{cases} \begin{cases} \searrow \\ \int = h\upsilon_{\delta e} \end{cases} \begin{cases} \text{PHASE-WAVE} \\ \\ \text{PARTICLE+GROUP-WAVE} \end{cases}$$
$$\searrow\ p_{Ae} = m_e c = m_e\ \lambda_q \varepsilon_k \nearrow$$

and another for the *electroinertial properties* of mass-energy (ie with reference to the charge property):

$$E_{\delta e} = e W_x = \int = \begin{cases} \nearrow\ W_x = \lambda_x \upsilon_{\delta e} \\ \searrow\ p_e W_x \end{cases} \begin{cases} \searrow \\ \int = h\upsilon_{\delta e} \end{cases} \begin{cases} \text{PHASE-WAVE} \\ \\ \text{PARTICLE+GROUP-WAVE} \end{cases}$$
$$\searrow\ e = m_e W_k = m_e\ \lambda_h \varepsilon_k \nearrow$$

We could just as well integrate the two functions or properties (while replacing mass by the aetherometric mass-equivalent wavelength) into their principle of variation as a "particle-waves multiplicity":

$$E_{\delta e} = \int = \begin{cases} \nearrow\ p_{Ae} c = \lambda_e c^2 = \lambda_e \lambda_q \lambda_c \varepsilon_k \upsilon_{\delta e} \\ \searrow\ p_e W_x = \lambda_e W_k W_x = \lambda_e\ \lambda_h \lambda_x \varepsilon_k \upsilon_{\delta e} \end{cases} \begin{cases} \searrow \\ \int = h\upsilon_{\delta e} \\ \nearrow \end{cases} \begin{cases} \text{PHOTOINERTIAL} \\ \\ \text{ELECTROINERTIAL} \end{cases}$$

The mass-energy of a particle of matter at rest or upon impact presents a characteristic electromagnetic (photoinertial) momentum; but once set in motion by an electric field, it presents an electric momentum (charge).

We should contrast these fine-structures with the electromagnetic energy *equivalent* of the electron mass-energy, a massless gamma ray (only observable, as such, when and if the electron mass-energy is entirely converted into a photon):

$$E_{\gamma\delta e} = \lambda_e c^2 = \int = \begin{cases} \nearrow\ c = \lambda_c \upsilon_{\delta e} \\ \searrow\ p_{C\gamma}\ c \end{cases} \begin{cases} \searrow \\ \int = h\upsilon_{\gamma\delta e} \\ \nearrow \end{cases} \begin{cases} \text{PHASE-WAVE} \\ \\ \text{PARTICLE+GROUP-WAVE} \end{cases}$$
$$\searrow\ p_{C\gamma} = \lambda_e c = \lambda_e\ \lambda_c \upsilon_{\delta e} \nearrow$$

Any photon can also be described either as a function of its intrinsic electromagnetic structure, or as a function of the electric structure of the kinetic energy of its emitter (electron as example), where a photon is emitted by conversion of a definite portion of that kinetic energy - a portion that corresponds to the loss of kinetic energy by a loop of the electroinertial conformation of the electron torus:

$$E = \int = \begin{cases} \nearrow \lambda_o c^2 = \mathbf{p}_C c = \lambda_o \lambda^2 \upsilon^2 & \text{ELECTROMAGNETIC} \\ \searrow \lambda_x W_k W_2 & \text{ELECTROKINETIC} \end{cases} h\upsilon$$

Lastly, it is apparent that (actual) kinetic energy (the kineton) also has a double reference. For the electron, we write:

$$E_k = \int = \begin{cases} \nearrow p_{AV} W_{AV} = \lambda_e n W_{AV}^2 = h\upsilon & \underline{\text{PHOTOINERTIAL}} \\ \searrow p_e W_2 = \lambda_e W_k W_2 = \lambda_e v^2 = p v = h\upsilon & \underline{\text{ELECTROKINETIC}} \end{cases}$$

with υ being defined electrically and 'quantically' by:

$$\upsilon = p_e W_2/h = W_2/\lambda_x$$

It follows that the electroinertial structure responsible for giving off de Broglie waves can also be paired with the photoinertial function for kinetic energy, since one provides the photoinertial description and the other the electroinertial description of the same waves that are experimentally detected:

$$E_k = \int = \begin{cases} \nearrow p_{AV} W_{AV} = \lambda_e n W_{AV}^2 = h\upsilon & \underline{\text{PHOTOINERTIAL}} \\ \searrow (\mathbf{p}_{Tm} \mathbf{p}_K)^{0.5} W_{AV} = \mathbf{p}_e (W_2 n/W_k)^{0.5} W_{AV} = h\upsilon & \underline{\text{ELECTROINERTIAL}} \end{cases}$$

These mass-energy and kinetic energy terms and momenta are given - in the traditional notation - by

$$\mathbf{p}_{Tm} = (n m_m E_T)^{0.5} = [n m_m (E_{\delta m} + E_k)]^{0.5} = \mathbf{p}_{Am} + \mathbf{p}_K$$

or, in massfree notation, by

$$\mathbf{p}_{Tm} = (n\,\lambda_m\,E_T)^{0.5} = [n\,\lambda_m\,(E_{\delta m} + E_k)]^{0.5} = \mathbf{p}_{Am} + \mathbf{p}_K$$

such that the total energy is

$$E_T = E_{\delta m} + E_k = [(\mathbf{p}_{Am}\,c) + (\mathbf{p}_e\,W_2)] = [(\mathbf{p}_{Am}\,c) + (\mathbf{p}_K\,v)]$$

These functional relations put to rest both Heisenberg's principle of uncertainty and de Broglie's relativistic model of 'matter-waves', thereby making Bohr's complementarity meaningless. It was another algebra that was necessary, not matrix-mechanics. An algebra of energy functions. An algebra that gave us better glasses to see, not one that assured us that we cannot see because things are fuzzy and there's nothing wrong with our glasses - just with our minds, because we think there should be something wrong with our glasses...

Appendix III - On the fine-structure differences between mass-energy, photon energy and ambipolon energy

The distinction between mass-energy, photon electromagnetic energy and ambipolar electric energy is made clear by the aetherometric treatment of the fine structure of the different particles. This can be succinctly explained to demonstrate the errors of the Zitter models of the electron.

Let us begin with electromagnetic energy and the description of the photon as a massless particle. Let us consider as example a gamma-ray photon with energy of the same magnitude as the electron mass-energy, 511 keV. The quantum expression for it is

$$E_{\gamma\delta e} = h\upsilon_{\gamma\delta e} = p_{C\gamma}\,c = \lambda_o\,c^2$$

where the photon linear momentum is neither inertial nor electric, but electromagnetic:

$$p_{C\gamma} = h\upsilon_{\gamma\delta e}/c = \lambda_o\,c$$

The quantum frequency of such a gamma photon is the same as the electron Compton frequency, but it now belongs to a photon -

$$\upsilon_{\gamma\delta e} = E_{\gamma\delta e}/h = 1.2356*10^{20}\ sec^{-1}$$

- while the wavelength λ_o defining the photon path is of the same magnitude as λ_e, so that we may write:

$$\lambda_o = p_{C\gamma}/c = \lambda_e$$

The light wavelength of this gamma photon is simply the Compton wavelength, λ_c.Thus, we can write the complete fine structure of such a photon as a homogenous one -

$$E_{\gamma\delta e} = h\upsilon_{\gamma\delta e} = p_{C\gamma}\, c = \lambda_o\, c^2 = \lambda_o\, (\lambda_c\, \upsilon_{\gamma\delta e})^2 = \lambda_e\, (\lambda_c\, \upsilon_{\gamma\delta e})^2$$

with the resulting angular moment

$$h/2\pi = p_{C\gamma}\, \lambda\!\!\!^{-}_c = \lambda_o\, (\lambda_c\, \upsilon_{\gamma\delta e})\, \lambda\!\!\!^{-}_c = \lambda_e\, (\lambda_c\, \upsilon_{\gamma\delta e})\, \lambda\!\!\!^{-}_c$$

Now let us contrast this with the mass-energy of the electron. In the standard electroinertial configuration, the fine structure is:

$$E_{\delta e} = h\upsilon_{\delta e} = p_e\, W_x = (\lambda_e\, W_k)\, W_x = \lambda_e\, (\, \lambda_h\, \varepsilon_k)\, (\lambda_x\, \upsilon_{\delta e})$$

The linear momentum of this mass-energy is electric, and ε_k is not a quantum frequency -

$$p_e = \lambda_e\, W_k = \lambda_e\, (\lambda_h\, \varepsilon_k)$$

The angular moment is the very same as the magnetic moment - and totally distinct *in fine structure* from any electromagnetic momentum - even though of the same exact magnitude, since it is quantal:

$$h/2\pi = p_e\, \lambda\!\!\!^{-}_x = \lambda_e\, (\lambda_h\, \varepsilon_k)\, \lambda\!\!\!^{-}_x$$

But in the photoinertial conformation, the electron mass-energy acquires an inertial linear momentum that must be expressed in a fashion totally parallel to the electromagnetic momentum -

$$p = h\upsilon/c = \lambda_o c$$

- yet differing by the fine structure of the wavespeed c that is constitutive of the inertial momentum

$$E_{\delta e} = h\upsilon_{\delta e} = p_{Ae} c = (\lambda_e c) c = \lambda_e (\lambda_q \varepsilon_k) (\lambda_c \upsilon_{\delta e})$$

It is the fine structure of the first c term that differentiates the photoinertial conformation of the electron mass-energy from the fine structure of the above gamma photon. The former is nonquantal -

$$c = (\lambda_q \varepsilon_k)$$

while the latter is quantal -

$$c = (\lambda_c \upsilon_{\gamma\delta e})$$

Even though "on the surface of things" the inertial linear momentum of the electron mass-energy is similar to the electromagnetic and massless linear momentum of a photon, in that the form is in both cases a function of (h/c) -

$$p = h\upsilon/c = \lambda_o c$$

- the (inertial) linear momentum of the electron mass-energy is *inertial* because it carries mass (curled into a torus) and therefore possesses a different fine structure:

$$p_{Ae} = \lambda_e c = \lambda_e \lambda_q \varepsilon_k$$

This difference extends to the angular moment, which for the electron mass-energy in the photoinertial conformation is

$$h/2\pi = p_{Ae} \lambda\!\!\!^{-}_c = \lambda_e (\lambda_q \varepsilon_k) \lambda\!\!\!^{-}_c$$

where

$$\lambda_q = \alpha^{-2} \lambda_c = \eta^{-1} \lambda_e$$

Accordingly, the angular moment of the electron mass-energy can be expressed for both conformations by

$$h/2\pi = p_e \lambda\!\!\!^{-}_x = \lambda_e (\lambda_h \varepsilon_k) \lambda\!\!\!^{-}_x = p_{Ae} \lambda\!\!\!^{-}_c = \lambda_e (\lambda_q \upsilon_k) \lambda\!\!\!^{-}_c$$

Finally, let us consider an ambipolon with the same magnitude of energy as the electron mass-energy or the above gamma-ray photon. The Coulomb potential is the same as for the electron mass-energy (since, magnitude-wise, $E_{\alpha i} = E_{\delta e}$) -

$$W_i = E_{\alpha i}/p_{e^\circ} = W_x$$

- so that we may indistinctly write

$$E_{\alpha i} = p_{e^\circ} W_i = p_e W_x$$

However, the fine structure of the ambipolon is neither electromagnetic nor inertial, but electric-ambipolar and massfree. Its magnetic and electric wavefunctions are of the same magnitude, so that the massfree charge is

$$p_{e^\circ} = \lambda_1 W_x$$

where, given the energy magnitude, $\lambda_1 = \lambda_h$:

$$\lambda_h = p_{e^\circ}/W_i = p_e/W_x$$

Moreover, in parallel to the massless photon, the massfree ambipolon is also internally homogenous, so that

$$W_i = \lambda_h \varepsilon_i = W_x$$

It follows that the ambipolon energy in question takes the fine structure given by

$$E_{\alpha i} = p_{e^\circ} W_i = \lambda_h^3 \varepsilon_i^2 = p_e W_x = \lambda_h W_x^2$$

with an nonquantum angular moment, since its electric ("Teslan") frequency ε_i is not a quantum frequency:

$$A_{\alpha i} = p_{e^\circ} \lambda\!\!\!^{-}_h = \lambda_h^3 \varepsilon_i/2\pi = (\alpha^{-1} 10^{-2}) (h/2\pi) \neq h/2\pi$$

Recapitulating, the four different energy fine structures under consideration are:

Electron ME, EI conform. $E_{\delta e} = h\upsilon_{\delta e} = p_e W_x = (\lambda_e W_k) W_x = \lambda_e (\lambda_h \varepsilon_k) (\lambda_x \upsilon_{\delta e})$

Electron ME, PI conform. $E_{\delta e} = h\upsilon_{\delta e} = p_{Ae} c = (\lambda_e c) c = \lambda_e (\lambda_q \varepsilon_k) (\lambda_c \upsilon_{\delta e})$

Gamma Photon (511 keV) $E_{\gamma\delta e} = h\upsilon_{\gamma\delta e} = p_{C\gamma} c = \lambda_o c^2 = \lambda_e (\lambda_c \upsilon_{\gamma\delta e})^2$

511 keV Ambipolon $E_{\alpha i} = p_{e^\circ} W_x = \lambda_h W_x^2 = \lambda_h^3 \varepsilon_i^2$

Aetherometrically, the velocity of light has a corresponding potential, fixed at 4.3407 kV, but the energy of a photon depends entirely on the value of λ_o. For example, the gamma photon of 511 keV has the form

$$\lambda_o c^2 = \lambda_e c^2$$

but a photon with $\lambda_o = \lambda_q$ would have an energy of just 4.3407 keV. Furthermore, its fine structure would also be distinct from the above gamma photon, and given by

$$h\upsilon = \lambda_o c^2 = \lambda_q c^2 = \lambda_q (\lambda_x \upsilon)^2 = 4.3407 \text{ keV}$$

where the quantum frequency $\upsilon = 1.0496*10^{18}$ sec^{-1} is obviously different from the Compton frequency, and λ_x is now the wavelength of light. Its angular moment would be

$$h/2\pi = p_C \lambda\!\!\!^{-}_x = \lambda_q (\lambda_x \upsilon) \lambda\!\!\!^{-}_x$$

with the peculiarity that its electromagnetic linear momentum would be of the same magnitude as the universal electric linear momentum, but not electric in nature(!):

$$\lambda_q (\lambda_x \upsilon) = 13.97017654 \text{ m}^2 \text{ sec}^{-1} = \int = \text{"}p_e\text{"}$$

It is because of both this natural artifact between different energy forms and the particular casuistry of the Maxwell-Lorentz electrodynamics, that A. Compton and the Zitter models have made the crucial mistake of taking a loop of the limit photoinertial conformation of the electron mass-energy for the electron itself. Since each loop inverts its flux by 360° - like a rotating bar magnet - they assume that the unit of fundamental charge resides in a (photoinertial) loop, so that they obtain the magnetic moment as

$$A_m = p_e \lambda\!\!\!^{-}_c$$

(or, worse still, as $A_m = p_e \lambda\!\!\!^{-}_c/2$), which does not equal $(h/2\pi)$, but

$$p_e \lambda\!\!\!^{-}_c = (h/2\pi)/\eta$$

If this were the case, then the electron mass-energy (whose determination they shun) would be η-times smaller than $E_{\delta e}$, and given by the electromagnetic relation:

$$p_C\ c = "p_e"\ c = \lambda_q\ c^2 = E_{\delta e}/\eta$$

wherein the Zitter models would further mistake a photon linear momentum p_C for a falsely electric "p_e", just because of the same momentum magnitudes of the two very different energy functions. They further compound this mistake by implying - without analysis - that the fine structure of this "electron" must be

$$p_e\ c = \lambda_q\ c^2 = \lambda_q\ (\lambda_c\ \upsilon_{\delta e})^2 = p_e \lambda\!\!\!^{-}_c\ (2\pi\upsilon_{\delta e})$$

as if, somehow, it equalled $h\upsilon_{\delta e}$ = 511 keV, when in fact, and demonstrably, it must describe the energy of a photon with a very different fine structure, since per force its quantum frequency is η-times smaller than Compton's - and so is its energy:

$$h\upsilon = \lambda_q\ c^2 = \lambda_q\ (\lambda_x\ \upsilon)^2 = 4.3407 \text{ keV}$$

In fact, the fine structure

$$\lambda_q\ (\lambda_c\ \upsilon_{\delta e})^2$$

simply does not exist - neither for a photon, nor for the electron mass-energy or the energy of an ambipolon. And if it did somehow apply to the electron mass-energy, the mass of this "electron" would be 117.7x smaller than it actually is. No wonder the mathematical approaches to this imaginary object are so fraught with absurdities amid all the unnecessary complexities.

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