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### Critical Appraisal of XXIst Century Energy Science and Technology (1): Relevance of Nikola Tesla's Inventions and Discoveries, from the Perspective of Aetherometry

Paulo N. Correa & Alexandra N. Correa

*Aurora Biophysics Research Institute, Concord, Ontario, Canada*

#### Abstract

This report is the first of a series of three reviews of the status of present-day energy science and technology. Its first part is dedicated to a succinct examination of the main inventions and discoveries of Nikola Tesla relating to those two topics: the polyphase AC system; the AC induction motors and generators; the Tesla coil and wireless resonant transmission at a distance of ground AC currents; the wireless transmission of AC power through the atmosphere; the operation of electrodeless lamps with wireless transmission of power through the ground or the atmosphere; Tesla's directed energy "ray gun"; his invention of the first drone (Teleautomaton) equipped with an onboard electroanalog computer; and his systems for energy capture from natural sources.

In the second part, these inventions and Tesla's theory of their operation and underlying physics are evaluated from the perspective of, and the contributions from, the analytical and experimental science of the massfree electric Aether (Aetherometry) that we have pioneered. We stress both the relevance of Tesla's work to the status of present-day energy science and technology, and the analytical and practical insufficiencies of that work. In this context, we review our theory of massfree and massbound electric charge, with an emphasis on our discovery of the finite-size structure, topogeometry and energy functions of the electron.

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## Introduction

Historically, our present civilization is unable to divest itself fast enough from the worst errors of its past. The old class society needed two world wars to finally yield to what was called modernity. But the latter did not last long either - it actually proved to be nothing other than a long descent into the present suicidary social chaos, through a myriad decompositions that globally corrupted all social institutions, public and private.

Still stuck in the past, in myths and confused notions that harken back to the previous two centuries, present-day societies with their globalistic pretensions have completely derogated their democratic principles and structures while converting under everyone's nose into veritable tyrannical mass-formations. The failure of "global capitalism" to develop positive life-changing scientific knowledge and energy technologies lies at the heart of the abortive social transformations that are driving all societies into abysses of self-destruction. Conventional or official physics, in particular, now lies on a death bed symptomatic of the degeneration of both science and society. For much that its conventions may claim to have overcome the problems of classical, relativistic and quantum physics, the result remains a travestism of science and of our effective understanding of nature, since its concepts are not embodied by clear and unambiguous functions.

The world of science and technology is still winging it on the coat tails of Tesla's monumental work, still unsure of what to do with it, but ready to claim that it has gone well *past* it. Well, has it? Of course, there is much knowledge in physics, electricity and the atom which has accrued since the time of Tesla's contributions. But has it really gone *beyond* Tesla, in the sense that it perfected his work and, moreover, resulted in a more cogent and coherent body of physics or electricity than Tesla had to offer? Tesla may well not have known what an electron actually is - but are we sure that existing physics knows any better what constitutes an electron or how it functions in all its aspects? Einstein thought that it would have been sufficient to know what an electron is in order to revolutionize the entirety of physics. We think it would take far more than this to figure out the entire physics of electricity, let alone the entirety of physics - that is why we founded the science of the massfree Aether, Aetherometry, and its consistent articulation of a new algebraic language of physical microfunctions.

Thus, in this spirit, we propose to first succinctly review the main milestones of Tesla's inventions, discoveries and theories; and, subsequently, to evaluate them from the analytical and experimental perspective of Aetherometry. We will not consider other inventions of his, such as X-ray tubes, magnetic rectifiers, improved unipolar dynamos, etc, that are not of direct import to the subjects at hand.

The present exercise should teach the reader how the smashing majority of the claims which others have made and continue to make about Tesla's body of work (for example, T. Valone, T. Grotz, P. Laviolette, J. L. Naudin, R. Golka, R. Hull, G. Egely, J. Bedini, or the sensationalist mishmashes of one Ashton Forbes, etc), to sell all sorts of amalgamations with rather unlikely theories (the Aether of Maxwell, the speculations of B. Haisch and H. Puthoff, etc), are the inevitable outcome of fundamental distortions of both Tesla's own views and the facts of nature such as they are. They only appear to be inevitable or even possible as long as basic science fails to elucidate, accurately describe and replicate the real functions at work behind, or beneath, the facts and processes of nature.

Tesla wanted others to refer to him as "The Discoverer", a modern Columbus who had found or uncovered a new continent of science. Some decades later, Wilhelm Reich also wanted others to refer to him as "The Discoverer", short for "The Discoverer of Massfree Energy" that he termed Orgone. Yet, it turns out that neither of them actually discovered what the *massfree electric Aether* is or consists of. They definitely touched down on the continent of *the electric Aether*, exploring vast territories and contributing amazing inventions and discoveries. They were pinoeering discoverers. But so did others that are also mostly forgotten, like Harold Aspden, Alfred Parson, Stanley Allen, Arthur Compton. A bit like Columbus' situation - the great new continent had always been there, and in many ways, some rather minor, others more comprehensive, there have always been attempts at discovering it. Many explorers got away with pieces of the whole, but in their hands and minds the pieces failed to meld into a systematic, testable and effective knowledge of the whole *qua* system or "continent". The concepts - beginning with the key concept of energy - were often insufficient and incoherent because the basic physical functions had not been adequately ascertained and tested (for a critical history of the development of the two sciences, official and eccentric, see [1-2]). The algebraic language of physics had not reached mathematical and functional consistency, the language being often regarded as merely operational and of a limited local value, rather than as a

functional and systematic articulation of fundamental categories. Society, science and technology are all paying a handsome price for this failure on the part of basic or primary science to break through the dogmas of the consensualized peer-reviewed institution of Official Science. In effect, the latter chokes, and at best throttles, the former.

## 1. Relevance of Nikola Tesla's Inventions and Discoveries

### 1.1 War of the DC vs AC currents

Tesla's first endeavour was to extract electric energy from natural sources, such as moving water. It was a desire he harboured from his childhood. The objective could, of course, be achieved as much with DC generators ("unipolar dynamos", Faraday's invention) as with AC generators (Tesla's invention). That AC generation won the XIXth century "battle of currents" has nothing to do with the feasibility of either type of hydroelectric power generation - which, therefore, was not the reason why the first hydroelectric plant built in Niagara Falls (by Westinghouse in 1893) operated with AC generators invented by Tesla. True enough, the plant definitely marked the victory of Tesla's AC system over Edison's DC system. Briefly, a water mill was connected mechanically to the rotor of an AC induction motor such that its stator generated 2-phase alternating current (ironically, besides Edison's company, the other defeated competitor, General Electric, also employed Tesla's method, but implemented by the Steinmetz 3-phase system).

Besides the tremendous animus which Edison held against Tesla, the central problem of the war of the currents was rather that of *their transmission*. The transmission of DC power along great lengths of wire required ridiculously thick copper wires to obviate the large resistive loss of power caused by "joule heating". In effect, a direct current deploys a continuous motion of electrons along the lengths of wire and, in the process, the electrons lose substantial kinetic energy by converting it into electromagnetic (thermal photon) emissions. To provide for this terrific shortcoming, Edison had anticipated his system's need to have DC recharging stations emplaced every few kilometers of laid wire lines. His arrogant character led him to obfuscate and resent the simple fact that his DC system was naturally lossy.

In contrast, alternating currents simply oscillate back and forth the electrons distributed along a transmission wire. There are still resistive losses but these could be

down-modulated by the judicious interplay of inductive and capacitive reactances. In particular, if the inductive reactance was kept low *and the receiver was tuned to the emitter*, and one employed high-voltage high-frequency AC and large capacitances to reduce the capacitive reactance to negligible values, large currents of high potential and high frequency could be transmitted with negligible power losses. The key lay on tuning the receiver - on reaching the condition of resonance when impedance is at a minimum. This is the real practical reason as to *how the (resonant) polyphase system* came to rule the production and transmission of electricity across wire grids that eventually striated entire continents and fed every street, building and household. Thus, historically, it was the best or most practical (or, *de facto*, most economic) solution to the problem of power transmission through wires that ultimately determined how Tesla's inventions of the AC induction motor and generator triumphed over the Edison DC system.

To this day, the wired electric grid of the world functions with polyphase oscillations that deliver AC power at 50 to 60 Hz, with electric potentials of 110-120 or 220 volts, and employs much higher frequencies (typically, 400 and 1,000 Hz) and greater voltages (typically, 6 to 10kV) for long-distance wired transmissions. The circulation of AC power through immense grid distances even serves as a primary system of energy storage, despite the minimized losses.

### 1.2 Wireless transmission of power (I): the problem of the nature of the Aether

Tesla, however, sought to go much further than the transmission of electric power through wires. Inspired by the phenomenon of lightning, he dreamt of transmitting electric power directly across space *without* the use of wires.

Here, he ran into all sorts of unsuspected difficulties, made all the worse by the then dominant (and erroneous) concepts of Maxwell's classical theory of electromagnetic waves and their propagation across a "luminiferous Aether". Tesla did not deny the existence of *radiant electromagnetic energy* structured in the maxwellian form of transverse-coupled electric and magnetic waves, but argued that the real Aether was *not luminiferous*, but rather composed of *radiant longitudinal electrical waves* that sustained the spinning of all molecules and eventually mobilized them (read, the massbound charges) to form alternating currents.

Note that one may think of the AC induction motor as being driven by a *rotary* electric field (in simple terms, a magnet or magnetizable rotor can rotate in the changing electric field of a stator, or a wound rotor fed such a changing electric field rotate in the magnetic field of a stator). But, in fact, while the electrons that are subject to the changing field only oscillate back and forth on the wires, the AC field itself is a longitudinally-directed wavefront that *spins in an helicoidal fashion* but in a *forward direction* along the coiled wires. It is the way the coils are wound and connected in sequence that results in the appearance of a rotating field. The so-called field rotation of the induction motor is simply due to the longitudinal displacement of sequential AC wavefronts, their number corresponding to the motor's optimal cycle frequency.

In one of his famous 1891 lectures delivered to the *American Institute of Electrical Engineers*, Tesla indicated how all motions of atoms or molecules were due to the spinning of the Aether 'atmosphere' surrounding them, a spinning that in his mind carried 'static charges':

"The spinning of molecules and their Aether sets up the Aether tensions or 'electrostatic strains'; the equalization of Aether tensions sets up other motions or electric currents; and the orbital movements produce the effects of electro- and permanent-magnetism" [3].

Thus, "the idea at once suggests itself that electricity might be called Aether" [4]. In other words, not light (and heat), but electricity is the nature of the Aether. Unfortunately, Tesla could not analytically detail the physical nature of this Aether-electricity, and readily distinguish it from the electricity of matter. In fact, his inclination was to conceptualize the electricity of matter as being entirely due to the Aether vortices surrounding the atoms and molecules. He was obliged, therefore, to *equivocate*: ultimately, "electricity cannot be called Aether in the broad sense of the term; but nothing would seem to stand in the way of calling electricity Aether that is associated with matter, or bound Aether; or, in other words, that the so-called static charge of the molecule is Aether associated in some way with the molecule". But, "precisely what the Aether surrounding the molecules is, (..) can only be conjectured" [4]. Keep in mind that this was written six years before the 1897 formal identification by J. J. Thompson of electrons as the mass-carrying charges that formed "cathode rays".

In effect, Tesla could not readily distinguish between *massbound electricity* - the electricity of mass-carrying monopolar charges, such as electrons and ions - and *massfree*

*electricity* - the "Aether-electricity" which these authors have termed "ambipolar energy" and is responsible for the electrokinetic effects of massbound charges, including first and foremost those associated with their spinning and their ordered oscillations that e.g. convey alternating currents. This inability was the Achilles' heel of Tesla's approach - one that ultimately thwarted both his theoretical and practical efforts (we will return to this problematic below). But it could not be otherwise, since we will see how the same inability remains to this day inherent to the entire edifice of conventional electrodynamics, which only recognizes the existence of monopolar (massbound) charges.

### 1.3. Wireless transmission of power (II):

#### invention of the Tesla coil and discovery of ground currents

For Tesla, the problem of transmitting electricity at a distance became the problem of how to propagate electricity across various media. The invention of the capacitatively-coupled coils (known as the Tesla coil) led him to discover a fundamental fork in the engineering of induction currents: either one emitted mostly electromagnetic waves from an aerial, or one emitted high-voltage AC currents that travelled through the ground. For the latter, the indifferent pole of the secondary had to be grounded - a little fact that both H. Hertz and E. Marconi overlooked and was pregnant with legal, technological and scientific consequences (see Tesla's interview by his legal counsel in 1916, in the context of Tesla's dispute with Marconi re. the invention of radio transmission in [5]).

After his disappointing meeting with Hertz, Tesla set out to figure how one could transmit energy and power without the use of "artificial wires", as he put it in his masterly 1919 presentation ("The True Wireless", in *The Electrical Experimenter*, May). His investigation led him to conclude that energy transmission could be done in two ways. The first method (which Tesla denoted as a method to generate "Hertz-wave radiation") resulted in a great dissipation of power, the energy dispersing *in all directions* of the space surrounding the coil or its different pole. Only weak signals could then be transmitted, which required a receiver to consume further power in order to amplify them. In effect, this is still to this day the technological situation with wireless telecommunications, and the reason why wireless transmission of substantial power continues to be a pipedream.

In contrast, with Tesla's method (the "resonant transformer"), *ground currents* that were formed by bundled longitudinal electric waves could *be directed* to a tuned receiver if

the key principle of frequency resonance was employed in establishing the transmission from an emitter to a receiver.

This analytical and experimental disjunction led Tesla to ultimately distinguish between inductively-coupled coils that operated by 'electromagnetic induction', from his capacitatively-coupled coils that operated by 'electrostatic induction'. Whereas inductive reactance increases with the size of the inductance and the frequency of the AC, thus burdening the inductive coupling, capacitive reactance behaves in the opposite manner. Precisely, the uniqueness of the Tesla coil that differentiates it from all other induction coils, is that its functioning as a voltage step-up transformer (voltage magnification) depends upon the square root of the ratio of the capacitances of the primary and secondary stages of the transformer. The Corums [6] and others have argued that the real Tesla coil is not a tuned coupling of "lumped coils" (as is the case of ordinary induction coils), but a "distributed resonator" that treats the secondary as "a quarter wave helical resonator". But our work [7] has shown that Tesla failed to realize that the wavelength of the *massbound* electric excitation is provided precisely by the capacitance of the secondary - when the latter is divided by the number of massbound charges mobilized in the secondary coil - and not by any function of the total length of the latter. Secondly, he failed to realize that the wavelength which he actually sought was the wavelength of the magnetic excitation characteristic of *massfree* charge, i.e. the wavelength of its (massfree) magnetic wave, and not that of its electric wave (the wavefunction of the Coulomb potential). Thirdly, he also failed to realize that the wavelength of the magnetic excitation is the coil length itself,  $\ell_C$ , whose function is provided by either the ratio of the secondary voltage (the  $W_{v2^\circ}$  wave) to the magneto-inductive (cyclotron) frequency  $F_B$ , or by the product of a velocity equal to one-quarter that of the speed of light divided by the characteristic electromagnetic frequency  $F_C$  of the secondary [8]:

$$\ell_C = W_{v2^\circ}/F_B = c/(4 F_C)$$

Thus, the wavelength of the magnetic excitation is not four times the length of the secondary. The speed of the massfree charges can and generally does greatly exceed the speed of light - as Tesla claimed was the case, though his determination at (1.5 c) was clearly an error (all the more since it is variable). In fact, we may determine the voltage (or

electric) wavespeed  $W_{v2^\circ}$  directly from  $c$ , if the electro-capacitative  $F_A$  and magneto-inductive  $F_B$  frequencies are already known:

$$W_{v2^\circ} = (c/4) (F_B/F_A)^{0.5}$$

It is only the 'electromagnetic' resultant of the two massbound field waves, electro-capacitative and magneto-inductive, which abides by  $c$  as its limit speed of propagation to develop a wavelength given by

$$\lambda = c/F_C = c/(F_B/F_A)^{0.5} = 4\ell_C$$

In fact, the speed of light  $c$  is thereby demonstrated to merely be an epiphenomenal wavespeed for photons that are generated from the superimposition of synchronous electric and magnetic excitations, or *kinetic* configurations, of massbound charge:

$$c = 4 W_{v2^\circ} (F_C/F_B) = 4 W_{v2^\circ} (F_A/F_B)^{0.5}$$

The resulting photons will have energy equal to  $h\nu$ , where  $\nu$  (the quantum frequency) equals the frequency term  $F_C$ .

Now, back to the question of interest: production of these photons is inevitable (it is the electromagnetic signature of a coil), but the energy that it consumes can only be minimized when the coil is loaded resonantly. This means that not only must the secondary be tuned to the primary (ideally with no spark gap), but more fundamentally that the generated capacitative  $F_A$  and inductive  $F_B$  frequencies of the *secondary* must be made resonant with each other (so that  $\ell_C F_B = C_2^\circ F_A$ ) - which means that they must be effectively synchronized to the underlying massfree (ambipolar) field frequency  $\mathfrak{E}$  of the longitudinal waves emitted by the coil, such that

$$\mathfrak{E} = (W_{v2^\circ})^2/p_e = W_{v2^\circ}/\lambda_{y1} = (\ell_C F_B)/\lambda_{y1} = C_2^\circ F_A/\lambda_{y1}$$

Likewise for emitter-to-receiver transmission - it only optimizes the capture of the emitted electric power when the massfree frequency function  $\mathfrak{E}$  of the emitter can be

effectively selected by the receiver's circuit, since the resonant receiver becomes the load itself. At resonance, the resistance of the emitting secondary reduces to the impedance of the coil, which the receiver's impedance must match (see also our 2007 patent [9]).

Frequently one runs into a well-established *lore* that purports the Tesla coil to be a device capable of extracting energy from the local Aether - and when not in its basic form, at least in the form of what Tesla later called "the magnifying transmitter". Such lore has long been entrenched in the ranks of the *International Tesla Society*. It also reached new pinnacles of absurdity in 2006, with the ridiculous, completely fictional film "The Prestige", featuring "that-man-for-all-seasons" David Bowie as Tesla, and where the inventor is demeaned to the point of turning into a mere reverse-engineer of alien technology... *Nvidia Corp.*, the microchip manufacturer who more recently brought us the accomplished hoax of Artificial Intelligence or Machine Learning, was a major promoter of this lore. The crackpot mythology was of service to marketers seeking to bamboozle the consumer with their products, be they computer chips or movies, etc: "a mythology has built up around Tesla that catches people's imagination" - gloated the *Nvidia* 'general manager of Tesla products' in a 2010 *WSJ* feature [10]. Spectacular mythology and fake technology, but not science, is what the name Tesla today serves to sell.

Yet, the Tesla coil and its evolution into the magnifying transmitter were not designed as devices that tapped the local Aether as a source of so-called "free energy". Nothing is further from the facts and the claims made by Tesla himself:

"I only used low alternations, and I produced 90 percent in current energy and only 10 percent in electromagnetic waves, which are wasted, and that is why I got my results." [5]

Tesla only claimed that using resonantly tuned Tesla coils as coupled emitters and receivers, one could ground-transmit at a distance to a receiver over 90% of the power spent by the emitter and, hopefully, reach nearly 100% if the transmission occurred at the natural frequency of the Earth (which was the objective of his Colorado Springs experiments in 1899). He supposed the latter to be dominant at either 6, 18 or 30 cycles per second (CPS). Thus, he came close to identifying the main mode of the Schumann resonances (at 7.83 CPS) and the spectrum of its overtones - which these authors have experimentally demonstrated are *not* ELF (extremely low frequency) *electromagnetic* frequencies (as official physics holds) but ambipolar (*massfree electric*) frequencies emitted from bundled free-electrons that are weakly (noncovalently) bound to ground water

molecules [11]. What remains doubtful is whether Tesla ever succeeded in transmitting such extremely low *ambipolar* frequencies with his Colorado Springs apparatus.

In another lecture, Tesla discusses in detail his famous demonstration of producing light at a distance from a Tesla coil (the emitter) by wiring unipolarly (i.e. via a single wire) to the ground the *different* pole of a resonant coil (equipped with an attached lamp) anywhere on a large field of grass and bushes [12]. To simplify, he even placed the receiver coil inside a vacuum lamp. In his 1919 "The True Wireless", he summarizes the variety of methods that he invented to generate these effects at a distance. By using several light-producing receivers, he could prove that the currents travelled through the ground, through the Earth's crust. He also proved that the intensity of power feeding the production of light was greatest when only one receiver was grounded at a time, so that the transmission became *monodirectional*. Adding more such receivers was equivalent to splitting the emitted power, resulting in more lamps being lit but each less intensely. He summarized the consequences of this experiment as follows:

"Assume that a source of alternating currents be connected (...) with one of its terminals to earth (...) and with the other to a body of large surface [e.g. a condenser plate]. When the electric oscillation is set up (...) alternating currents will pass through the earth, converging to, or diverging from, the point where the ground connection [of the source] is made. (...) The disturbance [on the earth's surface] will diminish with the distance, and the distance at which the effect will still be perceptible will depend on the quantity of electricity set in motion. (...) At what distance such a vibration might [still] be made perceptible can only be conjectured. (...) Theoretically, (...), it could not require a great amount of energy to produce a disturbance perceptible at great distance, or even all over the surface of the globe. (...) Within a certain radius of the source, a properly adjusted self-induction and capacity device can be set in action by resonance. (...) [Furthermore,] another source (...) or any number of such sources, can be set to work in synchronism (...) and the vibration thus intensified and spread over a large[r] area. (...) But the practical solution of this problem would be of incomparably smaller benefit to man than the realization of the scheme of transmitting intelligence, or perhaps power, to any distance through the earth or environing medium." [12]

Tesla's vision is that of a series of giant Tesla coils distributed on the Earth's surface to serve as synchronous sources which intensify and recharge the ground alternating currents, and are distinguishable by their resonant frequency characteristic. We are not too far, in a way, from Edison's recharging stations - once again, it is only the transmission that is more efficient and less wasteful.

#### 1.4. Wireless transmission of power (III): from lightning to electric beams

If Tesla was convinced he had solved the transmission of power through ground currents, the problem of the atmospheric transmission of power to ungrounded and suspended receivers remained. In Tesla's Wardenclyffe period, this immediately posed the challenge of how to transmit power across the atmosphere to a receiver borne aboard aircraft. In his vision - in drawings he made that, supposedly, he presented to J.P. Morgan - beams of electric energy would be directionally sent to electric automobiles and ships at sea, not just airplanes and Zeppelins. It was the tower that functioned as an irradiating source of electric power.

Tesla's investigations on the wireless transmission of power succeeded early on in producing at a distance light in ungrounded and even electrodeless lamps. Again the question came up - was this the result of an electromagnetic transmission operating by 'electromagnetic induction', or still another property of 'electrostatic induction'?

In a series of experiments that he detailed in his May 20, 1891 lecture, and again in his 1892 London lecture [13], Tesla demonstrated that it was possible to transmit high-frequency alternating currents at considerable distances to light up suspended or handheld lamps that (1) had a single electrode, the intensity increasing when the single electrode was grounded; or (2) had *no electrodes*, whether with *or without* metallic condenser coatings (that could be made internal or external). He built a room straddled at opposite ends by two suspended large condenser plates (likely connected across resonant secondaries, as he demonstrated and illustrated in the lecture), and showed that an electrodeless vacuum tube placed anywhere in the room would light up. He demonstrated these effects in the Westinghouse Pavillion of the Chicago World Fair of 1893 - the same fair whose buildings and streets were lit up everywhere by his polyphase system.

Though Tesla had at first thought that these electric effects at a distance were due to 'electromagnetic induction', he was eventually led to conclude that they were rather the result of 'electrostatic induction' - of a "rapidly alternating electrostatic potential" being transmitted (propagating) across space. But could this effect be engineered efficiently enough to transmit substantial electric power directly through atmospheric and vacuum (space) media (without ground involvement)?

His immediate answer was that this was a mere question of employing very high-frequency AC, as long as one could tap natural resonant frequencies of the atmospheric medium that allowed for unimpeded transmission of longitudinal electric waves. In this, he assumed that, unlike the terrestrial crust, the atmospheric medium resonated at high frequency. The transmission of electric power across great distances appeared to simply reduce to the resonant propagation of longitudinal electric waves across any medium - since media were defined by characteristic standing waves. But here is the crux of the matter which never quite transparently dawned in Tesla's mind: that, while to transmit power at a distance through natural media requires the ability to *propagate electric power without substantial energy dissipation*, which indeed requires frequency and energy resonance with the "electric Aether" states of the local medium, to direct that propagation requires formation of a *coherent* front of radiation that may serve as a kind of "waveguide". After all, it is energy that travels at a distance, not some hertzian signal disembodied of energy and reduced to a mere wave of potential. It is the structure of that carrier energy that must be made coherent.

The transmission of electric power at a distance was the actual purpose of Tesla's Wardencllyffe tower - one that he *actually hid* from the sponsor, J.P. Morgan, having sold the latter solely on the concept of transmitting information signals (telegraphy and telephony, what became known as radio) at a distance in more efficient ways than Tesla's competitor rival and chief copycat thief, Marconi, could do. Both factually and as far as Tesla was concerned, he (Tesla) was the legitimate inventor of radio. Indeed, independently from the problem of propagating effective power across the atmosphere or space, transmission of electric signals with their attendant magnetic effects was invented and perfected by Tesla well before Morgan promoted thievery by financing the success of Marconi's radio company.

Tesla may have been convinced that Morgan dropped the Wardencllyffe project when he realized what Tesla was up to - and that this realization had led Morgan to believe that, if energy anywhere in the world could just be obtained by tapping into the emissions of towers like Wardencllyffe, then energy would cease to be a commodity that one could sell and make a profit from, to become freely available to everyone. If that was what Morgan feared - and to some extent Tesla seems to have catered to this fear - then Morgan had completely failed to understand what Tesla several times stressed: that a

resonant reception of an emission exhausts the power consumed by the latter. In other words, the energy transaction could be gated as much by the power spent by the emitter/transmitter as by the registered consumption of the receiver. Tesla could not promise "a free lunch", even if he had wanted to - like the XIXth century breweries did. His Wardencllyffe tower was not designed or intended as a machine that extracted energy in excess of breakeven. It is only media lore promoted by the real crackpots that asserts the opposite.

Tesla was aware that cloud lightning already exposed one of the problems inherent to the transmission of electric power across the atmosphere. The paths of the sparks were never straight and frayed out; nor did the paths repeat in the same place when originating from the same source and hitting the same receiver, just as it happens in ball spark-gaps. The paths were not subject to any orderly control. Space ionization and ion-recombination were not homogenous stable processes present across the same abstract space. The shortest path was seldom if ever taken. Instead, nature sensed at a distance the changing paths of least resistance which were always curved and jagged. One might fix the source and the receiver target, but the paths between them ceaselessly varied, and so did the magnitudes of the voltage and current surges of the arcs. For that reason, Tesla sought to transmit electric power by means of glow-plasma formation in the upper regions of the troposphere or even in the ionosphere, in a manner akin to the production of auroras by solar radiation. Arguably, this was the objective of his magnifying transmitter [6]. But even though he *apparently secured* such plasma formations around the different pole of his Colorado Springs and Wardencllyffe secondary-coil structures, he was unable to prevent the dissipation of the electric power that was injected into the atmospheric medium (this led him to doubt the existence of the "Heaviside layer"). The followers of Hertz argued such prevention would be a physical impossibility, since - somehow in total contradiction with Maxwell's theory of electromagnetic waves - they claimed that the propagation of electromagnetic disturbances was spherical and thus, by nature, dissipative with distance travelled from the source.

Deprived of the necessary funds to continue his work by Morgan's withdrawal of investment, Tesla managed nevertheless to foresee what the correct approach to the problem would be: the generation of electric beams that would deliver effective power across space in every medium (as he titled it on a patent: "transmission across natural

media"). The problem was how to make these beams coherent. He considered the natural phenomenon of ball-lightning as holding a key for the coherent propagation of power across space. By frequency dephasing of a secondary coil when transiently exceeding its output power, he succeeded in segmenting the discharge to produce fireballs. He even tried to shape these fireballs into toroidal plasma discharges. If only he could guide these balls - such as hurling or beaming them at a distance - he might transmit electric power to a target receiver without energy losses. Throughout the remainder of his life, Tesla sought to realize this grand objective, even after all the successive incidents and accidents that made him lose his various laboratories (the greatest blow he suffered was perhaps the overnight fire that devastated his New York laboratory in 1895).

Eventually, Tesla's pursuit led to what others later called "Tesla's death ray". Following the 1934 publication of a series of articles in various newspapers (for example [14-15]), he wrote a 1935 overview [16] that presented his invention as a charged particle beam akin to the plasma output of what later became known as an arc-discharge jet. By ejecting a stream of metallic ions, he hoped to create a track or guide for the propagation of a substantial power beam across vast distances. In his view, neither the fireball gun nor the charged particle beam were radiant energy projectors, or ray-emitters. Given the utter paucity of his means, neither one resulted in a concrete technological embodiment.

### 1.5. Invention of the computer and drone technologies: the Teleautomaton

Using his invention of telephony to transmit signals at a distance, Tesla dramatically demonstrated a submersible robotic drone in 1898 - that he named the Teleautomaton (described in the 1898 USPTO patent No. 613,809). The device was remote-controlled in its motion and could perform simple computations onboard upon prompting from shore queries. It functioned with Tesla's own code of pulsed signals:

"For instance, somebody would ask, "what is the cube root of 64?" The boat would answer, "4". Anything that I could answer, the boat answered." [17]

This was the *first* example of a simple electroanalog computer, created long before electromechanical computers were invented in the 1930's as Gun-Directors by competing corporate efforts (Bell Telephone Laboratories, Sperry and GE).

The very notion of Artificial Intelligence so bandied about these days as a novelty was invented, in this very context, by Tesla. In a famous 1990 address [18], Tesla claimed he had already conceived of such a plan:

"I purpose to show that, however impossible it may now seem, an automaton may be contrived which will have its "own mind", and by this I mean that it will be able, independent of any operator, left entirely to itself, to perform in response to external influences affecting its sensing organs, a great variety of acts and operations as if it had intelligence. It will be able to follow a course laid out or to obey orders given far in advance."

By means of its engineered electromechanical organs and an onboard computer, the automaton could be made to act in response to "external influences" when *guided by a program* of "orders set in advance" that laid out a previous course of action, and which permitted the automaton to recognize ("learn") select influences and respond to them according to those orders. The automaton is *not autonomously intelligent*, but acts as if it is. It can only "think on its own" as far as the program permits it. It cannot be more intelligent than the program that runs it. It cannot respond in ways that are not programmed (only if it malfunctions by an error of logic or code), thus it cannot coherently innovate.

Today's competing AIs (Nvidia's, Google's, etc) may assert that machines can think on their own - but this is plainly just a hoax based on a totally defective and inadequate idea of what thought is (see our experiment with ChatGPT in [19]). In December 2024, Google reported that a "quantum computing" breakthrough in solving a complex computation led to a proof that parallel universes exist. Their AI team leader, H. Neven, absurdly stated that the result "lends credence to the notion that quantum computation occurs in many parallel universes". Though he was castigated by other astrophysicists and computer scientists for this abstrusity, it is the very notion of "quantum computing" that begs the question. All computers, even electroanalog ones, are literally quantum machines. And all along, digital computers have been binary machines that store and employ data in the form of 'bits', with either 1 or 0 as the assignable values. But, like sorcerer apprentices of F. Hegel's dialectics, computer engineers have long searched for "the spark of intelligence", to "engineer" it via what in their hyperbolic parlance they call "spooky effects". They created programs that encode data in what they cutely term "qubits" that, somehow, can have "at the same time" both values, 1 and 0. They confuse

the machine. They argue this permits a much greater density of encoded information, but what it really does - and this is rather evident in tests we ourselves conducted with ChatGPT [19] and other *equally dumb* AI machines - is generate haphazard results from the hammering together of contradictory propositional strings that are iterated in permuted arrangements, all deemed to be equal or equivalent. A stark example was this simple: unable by its program to learn from the web, it became, with some prompting, somewhat "aware" of "the Correas' invention of the PAGD plasma technology". But when asked for the names of the physicists or inventors - of those Correas - it could not find "Paulo" or "Alexandra". Instead it haphazardly threw, in succession, the names of five other Correas that did not even exist...

A machine that is programmed *to equivocate and lie* cannot even be said to have achieved a dialectical synthesis. It is just confused. That is the quality of the "spooky effect" - a sheer derangement, the abstract equality of equally useless outcomes. But the dementia of programmers reaches further - into neo-metaphysics. For these same AI scientists go on to claim that the spooky effects of "quantum computers" are themselves strong evidence for that recent fad of physics - the notion (another one) that there are "quantum entanglements" between particles such that absurd nonevents are given the status of physical facts: unrelated particles (for ex. acoustic phonons and electromagnetic photons) become lumped together by some abstruse mathematical sorting process; or, particles such as photons communicate from the future to the past what their paths will be, since Time can have a negative direction (thank the idiot Feynman for this one). We have debunked the core assumptions and the absurd inconsistencies that serve as basis for what should rather be called the "neo-quantum" fad of physics (for example, see [20]). Flight disasters would ensue if the AI employed to guide flying drones is made as equivocal and spooky as "quantum-computers" will have it - when the cube root of 64 could just as well be 3 or any other number for that matter...

There is nothing in today's drones, save the audio-video camera system, that fundamentally differs from Tesla's Teleautomaton. The directionality of the motion is in both cases remote-controlled. Like the Teleautomaton, modern drones are not devices that extract their energy from the surrounding medium. They must carry onboard a finite supply of energy, either as combustion fuel or in lithium rechargeable batteries. Tesla opened up his robot to show there was no person or animal hiding inside who actuated the

drone. That was obviously not the case, since his patent clearly identifies the presence of several battery banks ("storage batteries marked E") inside the drone as their source of power. Ironically, these batteries likely were the excellent iron-nickel cells invented by Edison. Like the Teleautomaton, modern drones carry onboard computers that interface with the remote-control console by transmitting signals back and forth, technically in either the radio or microwave bands.

Of course, the concept of a drone can be extended to any remote-controlled vehicle, including baticaphs, rocket missiles, space probes, etc. Unlike Tesla's hope that one day drones would reduce human warfare to mere battles between robots, they have proven to be horrific weapons of total war, assassination and mass control. The public became accustomed everywhere to watch pinpoint eliminations of people, buildings and cars on the IR cameras of drones. No technology can be made scientifically immune to its military uses. It is a fact that cannot on its own be seen as the mere result of an emotional malignancy, since there have always been wars that were just to the extent they were necessary. Yet, most military uses of destructive technology have been, and continue to be, simply malignant.

### 1.6. Energy capture from local natural sources

A photovoltaic panel is a system that can capture energy ("some of the energy") from a local natural source, such as solar radiation. Similarly, a wind generator captures some of the motoric force of an air flow, and converts it into electricity. If the wide continuous spectrum of *radiative energy* in the ground or the atmosphere, whether it be electromagnetic or ambipolar, had a sufficiently high density - in particular modes or characteristic frequencies - one could exploit these media by direct energy capture using Tesla's principles of tuned reception. The resulting system would be analogous to the operation of solar panels or wind generators: a natural flux is grafted. But even the power of the electric waves oscillating on the earth's crust at the Schumann frequencies is rather minute. The high potential intrinsic to the structure of the geoplasma [21] cannot be used since it is the very potential of the ground; only the pulsed current and potential of the natural flux of the bilaminar (geo)plasma [21] can be harnessed, as we have done, to charge capacitors and AA cells, and drive small motors (unpublished results).

As described by these authors in [22], Tesla long sought to devise a machine or machines that could tap directly into locally available natural energy sources. His initial thrust in this respect was to design AC induction motors that could be driven by the capture of either continuous waves (CW) or dampened waves (DW) emitted from high-frequency AC sources, whether these were generated by disruptive condenser discharges or as CW impulses that could be conveyed directly to tuned receiver coils. He provided an example of the latter in his 1892 lecture [23] using a nonferromagnetic disc rotor coupled to a secondary that served as antenna. But, once again, without an *artificial* transmitter that provided for the emitted waves, the receiver would not capture significant energy or any energy at all.

The search for natural sources was all about tapping transmitters that already exist in nature, in the medium of local environments. In this spirit, he presented the basic principles to do so in another patent [24]:

(1) to capture radiant energy - encompassing, in his view, such forms of radiation as "solar rays" or any "aether vibrations" - like those caused by "electrostatic induction" waves; or by the discharges generated with unipolarly-wired, high-voltage Roentgen or Lenard vacuum tubes; or, still, obtained from ultra-violet sources; and

(2) to convert the captured energy into electricity that could charge a condenser, drive an AC induction motor or operate an electric circuit, such as a relay or a discharge tube, etc.

The capture of energy from radiant sources capped Tesla's efforts at plugging his electrical machinery into "the wheelworks of nature". This was, arguably, his highest ambition. He could envisage how it should be done. But figuring the exact frequency resonance(s) in every medium, as well as the power conveying them, was a task for basic scientific investigation - and he had been denied the means to do so.

## 2. The perspective of Aetherometry

### 2.1. A major aetherometric discovery (1):

#### **The volumetric and energy structure of the electron mass-energy torus**

As we said above, Tesla was unable to analytically and experimentally identify and separate his "Aether electricity" from the ordinary electricity of matter, the electricity of massbound charges, be they electrons or ions. But forgotten only too often is that most of

his experimental work, technological engineering and lecture material occurred *before* even the formal discovery of electrons in cathode rays by their charge to mass ratio, let alone the near-accurate measurement of the charge of the electron during the years 1909-1913 by R.A. Millikan.

Tesla had largely relied on O. Lodge's vague notion of electric charge being the expression of an "Aether vortex" surrounding particles of matter - a patently insufficient concept devoid of real physical functions. Incidentally, the vortex concept of electric charge remains to this day a misinterpretation of the structure of charge that has survived in minor fields of physics (more on this below). In point of fact, other than the brilliant, *but never accepted*, 1915 theory of the "ring electron" proposed by A. Parson and subsequently developed by A. Compton and H.S. Allen during 1917-1921, the conventionally established concept of the electron has until today remained that of a point-mass reducible to its "localization" by a mere probability wave. The hammered marriage of these two abstruse notions hardly qualifies as a real physical concept. But it goes a long way to explain why conventional physics and electrodynamics in particular have remained *obscurantist mythologies* that should have failed to rise to the status of accepted science - in all of their variants: Maxwellian, Lorentzian and quantum.

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 - the first real element of matter - as purely toroidal properties. Yes, it forms a deformable "helico-toroidal ring", but even the "ring electron" theory was insufficient to construct and define the mass-energy torus. Investigation of the fundamental dynamic topology and structure of the electron mass-energy was nearly entirely abandoned. Academia, or military and corporate machines, along with generally imbecillic "angel billionaires" that understand no more than Morgan once did, may well pour zillions into research on the basic nature of charged particles without being able to advance an iota in the effective understanding of the structure and functionality of massbound charge. They are precluded from finding an adequate solution, when the problem is so ill posed to begin with. They are like a dog chasing its tail: stuck in place.

In reality, 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 energy", formed by

superimposed standing electric and magnetic waves [25] and devoid of any subparticle structure. Already in 2002, we had presented the basic model of the electron torus in our Berlin lecture [26], but the complete work was only published in 2011. More recently, G. Gryziecki summarized the core of our findings [27].

This fundamental discovery of ours has now remained for more than 23 years *unrecognized and ignored by both conventional and alternative theories of physics*. Only one physicist, the American Dr. Eugene Mallove - who was barbarously murdered in 2005 - fully realized its accuracy and vast consequences, when he learned its details, along with our discovery of the topogeometries of the proton, neutron, atomic hydrogen, molecular hydrogen, helium-3 and helium-4, etc. For this and other reasons, Mallove became the great champion of Aetherometry in the last 5 years of his life - thereby rendering *perfectly laughable* all efforts made by J. Rothwel, W. Zebuhr and their acolytes (all those who took over Mallove's publication, *Infinite Energy*) to repress, demean and ignore Aetherometry. If the reader has any doubts about this, it is time to read Mallove's last address to the ICCF-10 [28]. One may try to erase history, but cannot erase facts, let alone scientific facts. They will come back sooner or later to bite you when you least expect it.

In this context, we would be remiss if we would not consider and contextualize with respect to Aetherometry, the marginal efforts of a few physicists that in the past 75 years - and against the mainstream consensus - strove to describe volumetric topogeometries for the electron. And we would be all the more remiss if we failed to address very recent (2022-2024) proposals for finite-size electron structures, that were published without so much as even an acknowledgement of our ground-breaking work on this subject (it sounds familiar - like Marconi failing to acknowledge Tesla's priority in radio; or like the most typical debasing of our work in anomalous plasma discharges which always reduces and assimilates it to Chernetsky's self-generating discharge or to Shoulders' EVOs). Despite what below we will describe as the fundamental errors of these recent proposals (in particular, those of E. Markoulakis and E. Antonidakis, and of G. Vassallo), one cannot help but regard them, *to some extent*, as some sort of veiled attempts to recuperate our aetherometric findings by distorting and twisting them so as to fit with the Standard Model (by upholding its deeply erroneous value of the fine-structure constant) and Relativity, and in the process rehabilitate *inadequate* equations - such as the Maxwell-Proca, de Broglie, Schrödinger, Aharonov-Bohm, Schwinger equations - under the

umbrella of the *Zitterbewegung* paradigm. Even the Wolfram-plotted electron torus of Markoulakis & Antonidakis [29] seems, on the surface of things, like some cousin variant of the Wolfram-plotted electron torus that we published in 2011, or of the painted cover of that monograph [25] that one of us, Alexandra, drew.

In other times, it would have been a matter of self-respect to acknowledge the priority of other scientists in a given field, and cite their work. Those days are long past. Plagiarism, distortion and thievery, whether of parts or *in toto*, have ruled scientific research and publication for over a century. Imitation may be the best of eulogies or praises, but defaces what it claims to imitate or outdo - when it does not rob the entire creation. Furthermore, shielded in academic fortresses where what are otherwise papers of costly access can be had for free, physicists (and official scientists in general) do not feel obligated to acknowledge the work of credentialed and non-institutionalized, self-published scientific researchers - and further have the gall to complain when having to pay to access it. Ironically, those same academic scientists are the only ones that may be "recognized" for their self-publishing efforts in venues like researchgate, sciencedirect, arXiv, etc. Small wonder, since they provide the *free labour* that sustains these venues. It is even more darkly amusing - since just about all peer-reviewed publications have become but *advertising* gimmicks, where authors - most often through their departments or from grants - pay many thousands of dollars (even to digital outlets) to have their work given the *imprimatur* of a journal. It should surprise no one that most journals are owned by a few publishing consortia. Or that the peers became accomplices of this extortion racket - with the nefarious consequence that, more than ever in the history of science, false results are concocted and published.

We will not address here specifics of all Zitter models (such as A. Kovacs' spherical charge, the cycloidal spinning point-particle of M. Rivas, C. dos Santos' toroidal electromagnetic field, etc). We will do so in an upcoming communication. Instead, we will briefly concentrate on the models of Bostick, Consa, Vassallo and Markoulakis & Antonidakis because they illustrate well the problems that are endemic to Zitter models. A recent self-published review by M. Fleury ("The Zilch-Zitter electron", August 2024, in preprints.org) 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

reducing the concept to that of a "pure electromagnetic field". Mass and charge are taken to be but mathematical formalisms devoid of ontological status - thereby we become "free to misunderstand" what they stand for. Fleury, amusingly, ends up by telling a simple shakespearan truth: "The Zilch-Zitter Electron may ultimately be a tale told by an idiot, full of sound and fury, signifying nothing."

All the Zilch-Zitter models identify the rest mass of the electron with its supposed electromagnetic field energy, failing to actually differentiate mass-energy from kinetic energy, and subsuming both under the relativistic concepts of electromagnetic field energy and "relativistic mass". The latter is postulated to increase as the translational velocity of the electron increases - a tenet that far from unifying any analytical approach sinks the latter into a sea of absurd paradoxes. Instead of charge, the Markoulakis & Antonidakis model talks about "distributed charge", which, to save from inconsistency with the conventional notion that like charges repel, is described as *only in time* forming a geometric flux or "manifold". This means that the resulting geometric figures of the electron models do not describe actual physical objects - volumetric structures that at all times contain a continuous energy flux. Zilch models also have in common that they all 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".

Since WWII, there have been a few attempts to enunciate semi-classical theories that propose a finite-size, volumetric structure for the electron. These have been generally based on the *Zitterbewegung* paradigm, typically interpreted along P. Dirac's and R. Feynman's lines. It postulates that the energy flux which defines the electron as a particle stems from a jittery interaction of the electron with a sea of *virtual and actual* photons in the "vacuum medium". It assumes there is a closed circulatory motion of the electron's charge property around a center of mass, and that this causes what one measures as the electron spin (angular momentum) which, in turn, induces a magnetic momentum. D. Hestenes suggested in 1990 that the paradigm provided a new interpretation of the Dirac wave function [30]. 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 of the electron mass-energy, or of any associated kinetic energy.

In 1956, W. Bostick reported the formation of coherent toroidal structures of plasma that he termed "plasmoids" [31]. By analogy, this inspired him to propose a toroidal-solenoid structure at the Compton scale ( $10^{-12}$  to  $10^{-13}$  m) for the electron at rest, where the *charge* of the electron *travelled* at  $c$  through a closed helical path to form a closed torus and contain the resulting magnetic flux. Aetherometrically, the model had to fail, since the "turns" ("sub-rings" or loops) of the real energy flux of the electron torus are part of a continuous closed structure, not merely a path, and *the charge property* (the *electric momentum* proper) is *the product* of the total mass-equivalent wavelength  $\lambda_e$  formed by all the continuous loops of the torus *and* the spin velocity  $v_k$  (the equatorial magnetic wave or wavespeed  $W_k$ ) of the torus itself [25-26]; with the equality written in strictly equivalent traditional and aetherometric notations separated by the symbol (=f=):

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

Furthermore, the magnetic wave gyrates the whole torus by flowing orthogonally to the energy flux of the loops (described by the voltage-electric wave, or wavespeed of the Coulomb potential of 511kV), which travels at a much greater speed than the speed of light [25-26]:

$$V_x = m_e c^2/e =f= W_x = \lambda_e c^2/p_e$$

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.

More recently, in 2017, O. Consa published a revision of his Bostick-inspired 2014 dynamic (read "unravalled") helical model of the electron [32], in favour of a helical-solenoid one [33]. He criticized Parson's "ring" and Bostick's "toroidal-solenoid" models for being static, closed structures. He argued that an electron moving with a constant velocity forms a continuous, open ended, helical solenoid. Just as an unravalled ring becomes a circular helix, an unravalled toroidal-solenoid becomes what he calls an helical solenoid, a helix on a helix. Only at rest can the electron be thought as appearing to form a

torus. Consa proposed that the charge of the electron rotates at the speed of light with a radius given by the Compton wavelength. Aetherometrically, this view and its unnecessarily complicated though insufficient mathematics ultimately stem from the long-standing inability to distinguish mass-energy from kinetic energy (more on this below). In reality, the electron mass-energy is what forms the closed torus, whereas the kinetic energy only forms the distinct geometric envelopes of its displacement variants that are possible. They are geometrically distinct realities, even as they superimpose.

In a 2024 paper that addresses "charge clusters" and their role in low-energy nuclear reactions (LENR; on this topic the reader is directed to the third, or last, paper of the present series) - and which completely ignores our decades of plasma research with pulsed anomalous glow and arc discharges - G. Vassallo also proposed a "non-linear" *Zitterbewegung* model of the electron that, rather similarly to Consa's, describes how the charge property can form a ring when at rest, but creates helices when set in motion, with the open helicoidal path contracting with increasing velocity [34]. The spherical flux that defines charge rotates at the Compton frequency.

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. Another common mistake is that of defining the Coulomb potential of the electron as being equal to charge divided by a hypothetical Compton radius of the charge

$$V = e/r_c$$

when, in fact, the 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  $V_x$*  [25]. This radius is a direct function of the unacknowledged Duane-Hunt wavelength  $\lambda_x$  given by -

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

- so that the Coulomb potential of the *standard electroinertial conformation* of the electron mass-energy is simply a function of the quantum (Compton) frequency  $\nu_{\delta_e}$  of the electron mass-energy [25]:

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

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  $W_x$ :

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

To obtain the actual Coulomb potential from the electron charge, then, it just suffices to divide the latter by the wavelength  $\lambda_h$  of the electron's magnetic wave (see below) -

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

- or to multiply charge by the more exact value  $\epsilon_k$  of the so-called Bohr frequency, and then divide the product by the characteristic magnetic wavespeed  $W_k$  of the torus [25]:

$$V_x = \epsilon_k e / W_k = e / \lambda_h = f = W_x = \epsilon_k p_e / W_k = p_e / \lambda_h = p_e / 2\pi r_h$$

This simply demonstrates how the electron mass-energy deploys structure directly at the Bohr scale ( $10^{-10}$  to  $10^{-11}$  m). Follows the aetherometric master-equation for the mass-energy of the electron [25]:

$$E = h u_{\delta e} = m_e c^2 = m_e W_x W_k = f = \lambda_e W_x W_k$$

where

$$c = \sqrt{W_x W_k}$$

and, in the standard electroinertial conformation :

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

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

But 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 as unchanging until a specific velocity

limit is reached. To understand how this is a function of the proportion of the mass-energy to the kinetic energy of the electron, the reader should consult [35]. The radius of the Coulomb potential only reaches the Compton limit  $\lambda_c/2\pi$  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. The radius of the magnetic wave progressively increases just as the radius of the electric wave decreases. 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. When substantially accelerated, the electron conserves its mass-energy by increasingly resisting the adoption of the photoinertial conformation (what almost facetiously is referred to as "spin states"...).

Astonishingly, the 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 criticisms applicable as much to the Standard Model as to the 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" [36]. They do not suggest a mass-energy flux that is continuous - but, once again, that the motion of the electron *charge* describes a 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 [29, 36]. They retain the officiating dogma of the electromagnetic nature of the energy flux, going as far as venturing the 'commonly agreeable' possibility that the manifold may be formed by two "actual photons" that are 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. Markoulakis & Antonidakis "hammer in" the accepted and deeply erroneous value of the reciprocal of the fine structure constant ( $\sim 137$ ) 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":

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

Right here, one realizes how far their toroidal-fiber model falls short of the facts. For the classical electron radius  $r_e$  is merely a hypothetical term completely devoid of empirical proof, and once thought to be the radius of mass, not of charge. More importantly, though, the real and aetherometric physical equation for alpha simply stems from the proportion between the mass-equivalent wavelength of the torus and the Duane-Hunt wavelength of its standard loops:

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

- and it equals 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 preceding expression directly gives the total number of loops that form the standard torus, and puts the dimensionless alpha at [37-38] -

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

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

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

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

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

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

which not even Markoulakis & Antonidakis can save by turning  $r_e$  into the radius of "the horn tube of [an] electron". By suggesting that the Compton radius is the equatorial radius of the electron "manifold", they 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*. They are so determined to find structure at the Compton-Dirac scale that they mistake a loop of the photoinertial conformation of the torus for the actual electron. Whereas the equatorial radius of the real photoinertial torus is much, much greater than this, when the electron reaches its spread-out limit:

$$(\lambda_c/2\pi) + (\alpha^{-2} \lambda_c/2\pi)$$

Thus, it becomes clear that all the Zilch-Zitter models suffer from some kind of hypnosis regarding the physical meaning and role of the Compton wavelength in electron structure. This causes them to unwittingly address (at best) only the photoinertial conformation of the electron torus but, accordingly, like the proverbial prisoners of Zenda, never reach the actual physical terms of that conformation (jail), let alone the dynamic vistas of the *standard electroinertial conformation*. It also condemns 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

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

using Codata 2006 data. 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 of their

electron torus, the model of Markoulakis and Antonidakis (and despite its inconsistent 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". But, effectively, 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 electron is diamagnetic and it is the orientation of the magnetic vector with respect to the direction of overall motion that defines the 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 being just the negatron's chiral structure). This 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 momentum of the whole electron torus is conserved across both conformations -

$$A_o = p_e \tilde{\lambda}_x = p_{Ae} \tilde{\lambda}_c$$

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

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

and  $\eta$  is the Correa-eta constant [25],

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

In contrast, "the normal magnetic angular moment" in the electroinertial conformation is given by a substructure of the inertial angular moment -

$$A_m = 2 \mu_B = p_e \tilde{\lambda}_x / \eta = p_e \tilde{\lambda}_c$$

It is this relation which suggests the typical Zitter hypothesis of a charge rotating with the Compton radius (with the problem of the conventional value of  $A_m = \mu_B$ ) whereas in fact, in the electroinertial conformation, it is the magnetic wavespeed  $W_k$  that confers to the energy flux in each of the torus loops an inherent magnetic angular momentum. This only becomes evident when it is measured as "the anomalous gyro-magnetic moment" characteristic of the photoinertial conformation - as it never quite reaches the Compton radius but is directly expressible as a function of the Compton radius of each torus loop:

$$A_m = g \ 2 \ \mu_B = g \ p_e \ \lambda_c$$

There is no reduced Compton wavelength or radius involved anywhere. They are limits that cannot be reached if the electron mass-energy is to be conserved. 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:

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

The median of its oscillation gave  $g = 1.0011635$ .

Thus, it should not astonish us then that so much is wrong in the Markoulakis & Antonidakis model of the electron [29, 36], 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 into a blob ("field") of unlocalizable photon energy, and the same inability to realize that charge is not a travelling locus but the electric momentum of the electron mass-energy:

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

The latter error becomes exacerbated when Markoulakis & Antonidakis argue that the charge manifold adjusts its radius to become the wave function of the outer satellite electrons of atomic hydrogen and helium-4, as shown in their figure 6 [29]. They entirely miss the point that the hydrogen nucleus, the single proton, is simply 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, a structure it shares with molecular hydrogen. Atomic matter, whether on the outer scale of the atom or on its nuclear scale, is formed by electron toruses that are deformed to fit some inside others, and be stacked in particular ways.

Though closed, the real electron torus is not static in any sense - there is at all times a circularized flux through the rings of the torus, whose *standard* number is fixed by a simple proportionality constant [25-26]:  $\alpha^{-2}$ . Since the 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 the ongoing fads. All got it wrong. The charge is a property of the entire mass-energy, not a kink in a flux that travels around a helix or torus. And the mass, read inertial 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 [25], 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 fixed but *compressible* (which is what permits formation of liquid and solid phases of matter) and *deformable* with full conservation of its mass-energy. Thus, it can even adopt a "distended" *photoinertial conformation*. It is only the latter that deploys the Compton wavelength as limit and permits, upon inelastic collisions, the spread-out torus to become twist-looped over itself many times and briefly form closed, conico-helicoidal structures [25]. Such a process is at work in the destruction of the electron mass-energy, whether by positron annihilation or by self-annihilation with a quantum of kinetic energy that reached the magnitude of the electron mass-energy [35].

So, as far as our own research findings go, we may say that though attempts by academic physicists to understand the topogeometry, fine structure and energy functions of the electron have been few and rare and are most laudable efforts in *basic science*, they have nevertheless failed squarely to describe, in fact, a single electron. They have definitely

intuited the geometric structure and properties of the electron (energy, charge, mass, angular momentum, quantum frequency, etc), but they could not pin them down exactly or articulate their physical functions, settling instead for various "quantum-mechanical" approximations that invoke abstruse mathematics and tricks of the tail.

Little wonder that so much obscurantism reigns in the analytical and technological domains of the conventional science of electricity. More: if all the preceding were not enough to realize the miscomprehension of the nature of charge, 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 the energies of two massfree charges (ambipolons), or cells, of the electric lattice of the "vacuum medium" [25, 39]. Ontogenically, the process actual involves three such cells. The three mutually trapped ambipolons that in the phase-energy continuum generate the electron mass-energy, also generate the graviton-energy flux that holds that mass-energy together and drive the magnetic wavespeed of the torus. Without this phase-energy superimposition, the mass-energy torus of the electron would simply unravel, just as it does when a positron and a negatron inelastically collide to produce two gamma-ray photons (or one or three, as the case may be). The latter have no mass, nor associated graviton or ambipolar fluxes. Without a constant graviton flux, the electron toroidal flux of mass-energy would not be contained, and the electron would have neither inertia nor weight.

## 2.2. Another major aetherometric discovery (2):

### Ambipolons and the physics of massbound vs massfree charges

We contend that only from the aetherometric perspective does it become clear how and why Tesla was sorely missing both an accurate concept of massbound charge (defined by the ratio of charge to mass, a ratio which, as described above, *Aetherometry alone* demonstrates is *identical to the standing magnetic wave* of the massbound charge) and an accurate concept of massfree charge. In effect, in the last analysis, one is not possible without the other, if either is to be coherent. Massfree charge is the very source of the kinetic energy of massbound charges and conveys AC, DC and acoustic signals in the very fine-structure of its "particle-wave formations". In the absence of mass, the ratio of interest for massfree charge becomes that of the electric charge to its path-wavelength, which

yields the size of the magnetic wave of the massfree charge, and reveals its numerical equivalence to the electric or voltage wave of the "accelerating field" in "free ambipolons".

As we have contended, Tesla was twice handicapped: he could not adequately conceptualize either massbound or massfree charge. But the situation was even worse - and similar to that facing Reich a few decades later. To defend his notion of an electric Aether composed of longitudinal "electrostatic" waves, Tesla (and Reich) needed the concept of *ambipolar charge* - the realization that, whereas charge is a universal electric momentum of fixed magnitude, *the polarity of massfree charge* (of the electric momentum associated with massfree energy) is *phase-variable*, and not phase-fixed as is the case for the monopolar charges, positive or negative, of mass-bearing particles (whose electric momentum is a property of their mass-energy). For a complete and formal treatment, see [40]. In effect, the "Aether electricity" that is *reversibly bound to matter* is simply the electrokinetic energy of massbound charges. In contrast to it, the *intrinsic electricity* of monopolar charges is a property of their mass-energy, of its structure. The latter is the real electricity of matter itself - which, nevertheless, we may further conceptualize in cosmogenic terms as "trapped massfree Aether electricity" that, by being phase-energy *looped in a stable toroidal form*, gives rise to all the phenomena which together characterize "inertial mass".

It is ironic that Reich's concept of "orgone charges" also suffered from a parallel dual handicap: Reich failed to realize how massfree energy that carries charge, carries the same exact, universal charge momentum that is equally associated with mass; and he failed to grasp that there are distinct fine-structures to the massless energy of ambipolar charges and the mass-energy of monopolar charges. There are no special "orgone charges", or charges of different momentum magnitudes. There are only electric charges with the same momentum magnitude, some *ambipolar and fundamental*, others *monopolar and massbound*, that move in very different ways to do very different things.

Thus, one is led to the simple conclusion that mass-energy cannot, and should not, be relativistically conflated with kinetic energy - with electrokinetic energy - any more than massfree charges can or should be conflated with massbound charges. The two terms are not part of an undivided quantity of electromagnetic energy, as conventional physics and the Zitter-alternativists pretend is the case. Mass-energy has an intrinsic charge property, to which kinetic energy must adapt because, precisely, massbound charges acquire electrokinetic energy *from ambipolar energy fields*. They do so by capturing and

restructuring the energy of ambipolons as their own kinetic energy (the "energy-ambipolon" becomes an electroinertial "kineton") - and not as their mass-energy, which pre-exists any such capture. It follows that massfree charges (the real "electric Aether") only exist as such when their energy is *not* bound to matter, when it is "free" or in a free form. Once captured as kinetic energy, it is still technically massfree energy, but it is massfree energy that is now responsible for the electroinertial dynamic effects inherent to the motion of the particle of mass-energy. The kineton is no longer massfree energy in a free or native form. The articulation of these facts is, we think, what effectively puzzled de Broglie to no end - and the paradox he sought to conceptually avoid: that, if one recognized this duality of mass-energy and associated kinetic energy, one ended up with a superimposed charge duality, a kind of charge duplication that, nevertheless and somehow, paradoxically behaved as if it was simply a single (massbound) charge. He had reason to be puzzled and thereby seek both classical and relativistic solutions, even if all proved inadequate, given that what the electron diffraction experiments actually show is that what is diffracted is neither the mass-energy of the electron (an absurd contention) nor any energy-complex formed by this mass-energy and its kinetic energy, but *the electromagnetic waves* that result from *the quantum decomposition (shedding) of its electrokinetic energy*. We analytically demonstrated how the de Broglie waves, when correctly calculated, actually correspond to the quantized path lengths of the linear displacement of electrons in different states of high acceleration [35, 41].

### 2.3. Tesla and induction coils:

#### **emitters of ambipolar massfree electricity, not of electromagnetic energy**

In a group of extensive experimental and analytical papers [7-8, 42], we exhaustively demonstrated with an array of detection methods that the Tesla coil *fundamentally emits ambipolar radiation* and *not* electromagnetic radiation, whether optothermal or ionizing.

Tesla's experimental demonstrations that transmission of electricity at a distance was not due to "electromagnetic induction", but to what he called "electrostatic induction" were quite poignant for, in fact, there is no electromagnetic induction at all. Whether a secondary coil is coupled predominantly by capacitive or inductive methods to a primary, the physics are the same: production of ambipolons. Electromagnetic energy or photons is always generated, but all that really changes is that Tesla coils, unlike

ordinary induction coils, can be resonantly loaded to minimize generation of electromagnetic radiation. Again, Tesla was right.

Elsewhere, we have fully elucidated the unity of function behind the variety of forms taken by ambipolon emission [43]. On the boundaries of media (e.g. a conductor, an aqueous medium, a secondary coil, etc), processes (e.g. the surface of a cold cathode in pulsed plasma regimes) or systems (including biological tissue surfaces like skin), ambipolons are released by cooperative emission from tumbling planes of magnetically-aligned clusters of free electrons that together convert their electrokinetic energy back into an ambipolar form. But these free electrons are not electrons of state (which we have identified as responsible for the effects we call temperature and pressure, and termed modal and submodal in the ongoing publication of our work in thermodynamics); rather, they are *supramodal* or higher-energy free electrons which, depending on the concrete situation, are what one calls chemically-active electrons [44], or "upper-level excited" electrons, and so on.

As we have shown [43], the phase-flipping, cycloidal spiralling of the ambipolon energy geometrically forms the volume of an energy flux tube. Repeated tumbings of electron clusters result in the emission of tubular ambipolons in all directions of abstract space. The notion that electromagnetic energy propagates spherically stems from mistaking what is the spatially-unconstrained emission of tubular trains of ambipolons. Thus the crux of the matter when it comes to creating coherent directional rays of ambipolons: besides the geometry of the design, one must constrain the tumbling emission to a particular direction in space by controlled pulse-feeding of the production of boundary ambipolons.

With the sole possible exception of directed radiation in masers and lasers (but see more on this below), every transmission - even one of light from incandescent or any other lamps - is always and primarily a transmission of ambipolar radiation that indirectly and locally generates (at the source, in the intervening distance, and at the target) electromagnetic radiation, i.e. photon production, in what appears to form a continuum of light. When Tesla argued that his method of tuned transmission via ground currents prevented the generation of electromagnetic radiation, what he was actually getting at was that, by the methods of Marconi and Hertz, most of the energy supplied to the secondary

coils was dissipated locally in photon production. Their methods precluded the very principles of resonant loading of a grounded coil.

Though it is universally claimed that the energy emitted from induction coils is electromagnetic, our experimental results [7-8, 42] proved this to be one of the worst confabulated falsehoods ever devised. It betrays an *ad hoc* generalization devoid of any basic science, that nevertheless has been accepted for over a century by a consensus of physicists and electrical engineers. A case in point is the remaining lack, in conventional physics, of any concept of the fine-structure and even the massfree nature of actual photons [45] - the particles that constitute and convey every real electromagnetic field. It cannot even physically differentiate with mathematical exactness blackbody (optothermal) photons *from* ionizing photons, or ionizing radiation [46]. In a parallel fashion, it fails to realize that optothermal photons are regularly produced by emission from massbound charges (effectively, from the loops of the electron torus), via quantum conversions of electrokinetic energy into electromagnetic energy. But the resultant photon paths are all miniscule and, though radiative, serve only to dissipate the kinetic energy of monopolar charges into heat or light.

Thus, one arrives at the main energy-conversion disjunction: that the electrokinetic energy of charged particles of matter can be converted either into electromagnetic energy (heat and light) or back into ambipolar energy (massfree electricity). Both emissions are forms of massfree radiation, distinct from one another by their physical characteristics (functions) and effects.

#### 2.4. The problem of so-called "directed energy weapons" (1):

##### can one radiatively propagate substantial power at a distance in gases?

Let us first briefly consider the established theory of masers and lasers. The basic principle is that of a *tuned multiplication* of monochromatic photons (microwave or light "amplification") in a gaseous medium (atmospheric or vacua) that reaches a high density of electromagnetic energy when the number of "kinetically-excited" molecules becomes dominant, i.e. superior to the number of molecules found at the equilibrium temperature of the medium. This initial step is called the *pumping process*, and it is followed by a "stimulated" release of the kinetic energy stored by the excited molecules, resulting in the emission of a beam of coherent heat (microwave in masers) or light (in lasers) sent in a

direction parallel to the long axis of the masing/lasing cathode. Physicists learned to form coherent beams (generally treated as linear trains of "wavepackets") when they discovered how to use *carrier waves* to transmit radio signals.

According to Aetherometry, engineering these carriers is a matter of synchronizing and directing the underlying ambipolar emission. Unlike other signals, electromagnetic signals are not carried directly by ambipolons, by the actual carrier waves, since they are simply generated when the ambipolar energy that was captured as electrokinetic energy by antenna electrons is released by quantum photon production. Thus, the situation of electric signals (AC, AC-like, pulsed DC or electrostatic) and acoustic signals is rather distinct from that of electromagnetic signals. Electric and acoustic signals are transmitted directly by ambipolons, in their energy and power fine-structures [43].

Conventional physics claims that, in 1962, laser beams were successfully detected to having reached the moon with a splayed-out impact diameter of some 3 km. Evidently, the beam diffracts through media, and increasingly so with distance. It loses power and coherence as the distance it crosses increases. In effect, any environmental factor found along the beam path (e.g. other electric and magnetic fields, changes in barometric pressure or gas density, changes in temperature and humidity, etc) that will absorb beam energy results in loss of power and beam coherence, as energy is absorbed without the resonant photon being emitted. Aetherometrically however, if the lunar-impact claim was correct, it should stand as proof that it was not the photons that propagated across the vacuum of space, but the ambipolons that served as their indirect carriers. Let us delve into this a bit more.

Close to the masing/lasing source, the high-density of the electromagnetic energy concentrates the power of the beam. But the transmission of this power depends on the propagation of the beam which, in turn, depends on the wavelength of the masing or lasing photon *being sufficiently long to bridge the distance* between neighbouring electrons, atoms and ions, such that the very condition envisaged by Einstein as early as 1921 results: the photon emitted by an excited molecule ("ion") when it falls to a lower kinetic energy level must be exactly identical to the photon that, to begin with, excited the molecule to the higher energy level. In practice, three different molecular energy levels are employed, the lasing power depending solely on the energy release that occurs between the lower two levels.

But how does, or can, the laser beam propagate *outside* of the lasing device, beyond it, while preserving its coherence and minimizing energy decay? The fact it can be emitted clearly indicates that a density threshold of electromagnetic energy (a "boiling" condition) had to be met along the path, and that, for as long as the photon energy density remains above that threshold, the beam can propagate through the outside gas. But at least one other condition must apply to enable the molecules of a gas to receive and re-emit, to pass along or chain-replicate, the same photon energy: that the photon wavelength may be able to bridge the inter-molecular distance taken along a longitudinal beam direction. Then it becomes obvious why it is so difficult to build and operate ultra-violet and X-ray lasers: depending on the barometric and gravitational pressures of a medium, the photon wavelength may be too short to bridge the inter-molecular distance that permits propagation of high-density, consecutive chains of resonant photon-absorption/photon-emission events.

However, aetherometrically, we will argue that while beam propagation may well initially depend upon the "inter-molecular" bridging action of the "transmissible" photons, it still needs an underlying and directed ambipolar stream that may serve as the electric wavefront of the electromagnetic beam - as its track or actual waveguide. The optothermal photons are coherently formed, absorbed and reformed along a directional path because there is a travelling ambipolar wavefront of energy leading the way, pushing, much like sound waves do, molecules and free electrons into collisions with, and atop, other molecules and electrons present on their paths - making them jostle one another in a field-ordered way that, nevertheless, sonically or ion-acoustically disperses the absorbed ambipolar energy via emission of photons. As the ambipolar wavefront is absorbed by the medium and attenuated in its power, the coherence of the beam begins to break down. The limitations that exist for microwave transmissions, including those of tower and satellite telecommunications, have the same root cause.

Since there is no physical understanding of ambipolon emission, there is no direct engineering geared to optimize the electric resonance of the underlying ambipolar transmission with the electric characteristics of a medium (in particular, its modal electrical frequencies and its internal pressure). Lossless propagation of power requires that every local absorption of an ambipolon that will occur along the beam path must be matched by the cooperative emission by the local medium of an identical ambipolon moving along the

same radiative trajectory. Thus, there is a grave limitation inherent to the design of lasers and masers which causes the terrific impasses (small blessings) that will continue to face the development of so-called "directed radiant energy weapons" that would be capable of transmitting and delivering substantial power to a receiver/target. But the race is on, all over the world. Recently (*Daily Mail*, 20 January and 12 March 2024), there was a spate of news about the the 50 kW Dragonfire laser developed by a British consortium of the government (MOD, Army and Navy) with industry partners, which reported successful destruction of an aerial target. Though purported to be able to destroy drones and missiles, the attained range was not disclosed, though it did not appear to exceed 100 m. On October 28, 2024, Israel announced the launch of a similarly designed "Iron Beam" (estimated at 100 to 150 kW) for late 2025.

Evidently, Tesla could anticipate the necessity of having an electric wavefront serve as the drive for an ordered, travelling flux of massbound charges, e.g. plasmas, at a distance - just as a leading stroke determines the subsequent path of the return stroke (the acoustic intensity of thunder arises from their mid-air collision). According to the notes of Dr. J.G. Trump (uncle of the 45th and 47th President of the USA, D.J. Trump), the scientific-intelligence specialist from the NDRC (National Defense Research Committee) of the OSRD (Office of Scientific Research and Development) who was brought to examine Tesla's papers after the inventor died, one embodiment described "a beam of high energy electrons (...) concentrated nondispersively" and produced by "an electron acceleration tube" driven by a "high-voltage electrostatic generator" [47]. Likely, the high-voltage field was applied to electrons released thermionically. Another embodiment was found in the same papers, where metallic ions driven at high voltage were ejected to form a beam. Thus, he was not seeking a device that cohered electromagnetic energy (such as a laser or maser), but rather an ion-gun or ion-jet. There is a whole voluminous history of the various experimental incarnations of ion-guns and their use for propulsion in ion-drives and arcjet engines throughout the last century (on this subject, see [48]). They have had limited success in propulsion of aerial vehicles, but none have panned out as being capable of sourcing electric beams that surmounted significant distances to deliver substantial power in a nondispersive manner.

## 2.5. The problem of so-called "directed energy weapons" (2): can power be propagated in gases by directed fireballs?

It may well be that Tesla's idea to use lightning fireballs as a means to the lossless propagation of power across space is the only method that might do so. M.B. King [49] once suggested that anomalous lightning balls were produced in corona discharge tubes designed by T.H. Moray, possibly by tuning a plasma diode to resonate with heavy ion acoustic oscillations [50], but as is usual "in things Moray", the details were scanty. German electromagnetic cannons were retrieved by the CIOS (Combined Intelligence Objectives Sub-committee) in 1945, which reportedly were capable of shooting out lightning balls into the atmosphere [51]. These would supposedly have been responsible for the sighting of fiery balls near aircraft reported by Allied pilots over Germany and American pilots over Japan - where they acquired the popular name of "Foo-Fighters". Much too much remains unclear on this matter. Aspden drew attention to the efforts of P. Kapitza, in the USSR, to drive the formation of plasma balls in vacuum tubes with an RF source [52]. Kapitza apparently realized that the energy densities of lightning balls were of the magnitude required to initiate nuclear fusion.

There is, to this day, no satisfactory scientific explanation for the phenomenon of electric fireballs. Back in 1963, D. Ritchie analyzed the formation of lightning plasma balls, which he thought could potentially result from two types of plasma instability, pinched or kinked [53]. He concluded that the *kink* model was the "more reasonable" source, with a plasma column becoming *pinched at two opposite ends* to release a rotational plasma ring or doughnut. Whether producing Bostick's plasmoids or toroidal lightning balls, nature simply *scoped macroscopically the microphysical electron torus* described by Aetherometry. However, Ritchie did fail to realize that, just as it happens with the electron torus, (1) the toroidal "rings" or loops are not the magnetic lines, but rather the electric lines of the Coulomb potential; (2) the equatorial ring "current" of the torus is its real magnetic field wave, a standing wave; and (3) 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.

Ritchie focused "microwave radiation" from a pulsed X-band radar on an ongoing plasma glow discharge inside an evacuated glass chamber, and produced "ball-lightning-like" plasmas that decayed in 290  $\mu\text{sec}$ . He discussed potential practical applications [53],

such as a new source of continuous or pulsed light. Aspden was somewhat skeptical of the relevance of these results, since he thought that the most likely mechanism by which fireballs were generated was the pinch-instability: ball-lightning "can hardly be applied unless the mechanism underlying its creation is understood" [54]. Aspden suggested that a pinch in the lightning discharge channel could be the mechanism behind its natural production.

Ball lightning is a natural *atmospheric* phenomenon that frequently arises from close cloud-to-ground discharges. From observer reports, one gathers that "luminous fireballs" appear to spin, may attain diameters of more than 20 to 100 cm, and last a few seconds to tens of minutes before fizzling out or exploding. The color of their luminosity is most frequently reported as being yellow to red orange, but many reports describe violet and blue balls, and balls displaying rainbow colors. Most importantly, observers often mention *a translucent or even a transparent core* - that 'they could see through its center' - which is strong observational evidence of the toroidal nature of lightning balls. Furthermore, it suggests that they move at the rate of gyration of their magnetic field wave, using the electric wave of the continuous loops of the torus as a kind of propelling tread.

Another peculiar trait of fireballs is their relative stability in motion and duration. Even more amazing are the traits characteristic of their motion - a strange ability to move, in straight and curved paths, while floating and bobbing, and rather frequently ascending over obstacles (buildings, trees) as if the fireballs were weighless balloons that avoided obstacles. Thus the notion of a torus rolling by magnetic gyration on an electric tread that interacts with local electric fields. Some have described fireballs as rolling and floating along invisible tracks parallel to the ground, or over and along the top of stone walls.

Lightning balls are most often reported in hot and humid weather, in the wake of lightning, whether immediately following an acoustic boom or silently, but many have also been reported to arise in hot, dry summer days. They frequently enter and exit buildings by open doors and windows, but have also been observed to emerge from building walls and electric sockets.

That fireballs are luminous objects indicates they sustain a continuous production of photons. Thus, the process of dissipation of the electric energy of fireballs is electromagnetic. This does not preclude their electric energy from being regenerated by the same process that, to begin with, created the rotating magnetic flux and the radial

electric field of the ball or torus. Aspden speculated that the radial velocity of the spinning spheres may be on the order of the medium's speed of sound. If this may be the case, then, from our own soon to be published research in electroacoustics, the gyrating toroidal tube will likely have arisen from bending two counterflowing acoustic ambipolons into a "circular standing wave" with a characteristic frequency, that would bind by "electrodynamic pressure" the toroidal plasma(s). In this perspective, the fireball would consist of synchronous self-sustaining ion-acoustic processes driven by an internal standing ambipolar flux. The net magnetic flux would result from the speed differential of the counter-rotating plasmas.

The fireball plasma dissipates energy by photon production but the "circular standing wave" is internally reformed or sustained, for a sizeable duration in seconds or minutes. We suggest this happens by means of synchronous tumblings of aligned clusters of mutually trapped electrons and positive ions that counter-rotate relative to one another in distinct layers, and repeatedly emit acoustic ambipolons with the same respective energies, that are subsequently absorbed. Such a cyclic process would generate the buoyant behaviour of fireballs, as if the objects had no inertia. This is in line with the results of unpublished experiments that we conducted which showed how metal foils connected directly as a resonant load to the output of Tesla coils had their weight nearly completely cancelled by the generated ambipolar field. This contrasted to the half-weight cancellation maximally obtained with foils connected to a comparable DC source of high-voltage [55].

The question then arises as to what replenishes, and may continue to replenish, the electrokinetic energy of fireballs - so as to sustain its internally-rotating standing wave and the requisite (torus) capacitance. To explain the energy source of ball lightning, Aspden invoked his treatment of an "Aether Spin contribution" made from the lattice of the "space medium". We think the explanation likely is considerably simpler. Natural occurrences could be driven by the initial electro-acoustic train of impulses, until it is exhausted. But if artificially launched, say, by pulsing a plasma discharge along an inductive track, we speculate that one might be able to continue to replenish the energy of the circularized standing wave by means of a directional beam of electro-acoustic impulses emitted at the ball's resonant frequency and capable of tracking the ball as their target and even guide it by pushing it along. Plenty of observers report hearing fireballs hissing or crackling, which suggests they generate high frequency ( $\gg 10\text{k}$  cycles per second) sonic

emissions. This does not mean that the standing acoustic-electric wave which is internal to the fireball may not have an infrasonic frequency. Be that as it may, the electric potential of the acoustic impulses must be high, substantially greater than the ambipolar potential of the local medium at its equilibrium temperature (the study of these potentials is taken up in chapters 7 and 8 of AToS volume VI on thermodynamics).

## 2.6. Plugging machines directly into the wheelworks of nature

There is a fundamental disjunction to the possible meaning of what it is to "plug technical machines directly into the very wheelworks of nature" - the famous expression that Tesla coined. On one hand, the approach it refers to - and *Tesla's original meaning* - is the capture of energy available in local environments. This category encompasses a variety of technological embodiments, from the photovoltaic cell or panel, to Tesla's apparatus to capture "solar rays", including the Aether Motor. All are designed to capture energy which may be deployed *through* natural media and available in the local environment. On the other hand, the expression can be made to refer to the pursuit of systems or methods that may trigger, by an energy input, natural processes that release more energy than was input to drive the trigger. The very confused corollary of entropy that has been unduly attached to the Second Law expressly forbids such processes. Yet, as biochemistry has had to acknowledge, such processes preside over the enzymatic action of proteins and even nucleic acid polymers that is essential for living systems. Moreover, the pursuit of nuclear fusion has long been predicated on the same tenet of energy in excess of breakeven - and our own work, over three decades, with auto-electronically emitted plasmas from cold cathodes proved that processes which release energy in excess of breakeven are real. In more recent (2012-2015) and unpublished research work with cold plasmas, we detailed the exact mechanism that triggers the local "medium of space" to release ambipolar energy in excess of the input energy. We will return to these technologies and their physics in the *third paper of this series*. Presently, we will briefly address Tesla's efforts to directly capture radiant electric energy.

We experimentally reproduced and analytically traced Tesla's discoveries and inventions that were geared to the capture and utilization of radiant energy in our disquisition about the history of Tesla's "Aether Motor" and Reich's "Orgone Motor", as it wove together with our own re-discoveries and further inventions along the same line of

research. We will not presently go into it, since we are presently releasing that book [22] for the first time in digital format. It was designed as the first of two volumes, and we will soon release the second volume. This work led to the first Aether Motor/Converter (AMC) patent issued by the USPTO in 2006 [56].

The greater importance of these investigations in capturing energy available in local media lies with Tesla's own concept of a system of multiple sources synchronously emitting, intensifying and recharging ground currents that could be tapped anywhere by reverse-wired resonant receivers. Of course, nothing prevents employment of such receiver coils to capture the energy of oscillatory currents that are naturally present in the ground, in the atmosphere or in any medium. These authors have conducted extensive experiments, some published [22, 56-57] but most unpublished, on varied methods (inductive, capacitive, acoustic, mechanical) to capture from diverse media (the ground, the atmosphere, a body of water, the human body) both alternating and pulsed-direct currents, in wide (continuous) and narrow electric frequency bands. Generally, however, the more narrowly tuned is the reception, the lower is the power captured. Such electric methods of energy capture do not encounter ambient fluxes at specific frequencies with the high enough energy densities needed to allow substantial extraction of power - not beyond a power capture of some 10 watts. However, it is true that with the recent LED technology (a victory at last for basic science!) one can now deliver the equivalent light of a 100-watt incandescent lamp (Edison's invention...) with a mere 15 watt expenditure (likewise, given the same 500 lumen output, a 50-watt halogen has become replaced by a 5-watt LED, a 10-fold reduction in consumed power), lending back to these methods of capturing ambient energy a renewed interest for their possible use. Nevertheless, it will not be here that an energy source will be found that may satisfy the ever-growing terawattage expenditures of contemporary society. In effect, only methods of the second type may provide for such energy "needs" (since so much energy is uninterruptedly spent by AI systems, the cloud, crypto mining and in the phantom power expenditures of "the internet of things").

### 3. Some conclusions

Tesla's work and the questions it left open remain relevant to the present status of energy science and technology. All the more so as conventional physics continues to ignore the existence of massfree electricity and the spatio-temporal energy structure and functions of massbound charges, such as the electron or proton. In effect, conventional physics has in this respect advanced rather little since late XIXth century. Furthermore, the usage it has made of Tesla's work, though profuse, is rather shallow.

In contrast to conventional physics, for now over 20 years, we have extensively published a body of experimental and analytical research (Aetherometry) that has made tremendous strides in the scientific understanding of the nature of electricity, heat, light, inertia, gravity and nuclear reactions. It generated a consistent algebraic theory of physical microfunctions that we have successfully applied to all those realms of physics to resolve a large number of existing and seemingly paradoxical problems. It behooves scientists - physicists, chemists and biologists - to make the effort to acquaint themselves with this body of work, instead of shunning it in fits of irrationality or by sheer laziness of spirit - or, worse still, distorting it for ends that are not those of science. The challenge is all the greater, since we have provided technological embodiments, patents and blueprints for a variety of machines or systems that can either capture energy from local media or extract energy in excess of breakeven from nonthermodynamic nuclear fusion and anomalous plasma reactions. In effect, *after* 3 decades of knocking on the doors of utilities (for ex. Ontario Hydro), all sorts of corporations (e.g. Duracell, Charter Power Systems, IAI, Alcoa, Alcan, GM, Toyota, Microsoft, etc), billionaire "angel investors" (for ex. Y. Stein, G. Soros, C. Entenmann, S. Kimmel, D. Gilo), and of having provided potential investors under nondisclosure with countless demonstrations of various embodiments, it has become plainly clear to us that *despite* the dedicated support for our work on the part of other scientists, our peers (Dr. E. Mallove, Dr. H. Aspden, Dr. J. Thompson, Prof. H. Branover, Prof. A. Axelrad), the majority of physicists have remained blissfully ignorant of our work. To some extent, this was inevitable since we have chosen to publish this work at our own cost and outside the perverse peer-review system of mainstream science publications. We have extensively documented what scandalously happened with three of the top physics journals and Antonio Scotti - then an editor of the *Journal of Mathematical Physics* and professor at the Mathematics Department of the University of Milan - when we tried to

publish our ground-breaking work on the Ives-Stilwell experiment [58-59]. On the other hand, given the unorthodox nonsubmissive quality, the format and the sheer amplitude of the papers, monographs and books that we have released in the past 30 years, we wager we would never have been able to get a fair-shake or the required space, in any contemporary science journal. Mallove's own *Infinite Energy* was the only exception. It was therefore inevitable, in every sense, that we had to self-publish at our own cost - an effort that we could not have carried out without the relentless and tireless work of our dear friend, collaborator, co-author and editor, Dr. Malgosia Askanas. Along the way, others, too many to mention here, helped the effort either by being involved in the work or by granting us generous financial gifts.

In our view, a positive change in the impoverished status of energy science and technology cannot be brought about unless a great number of scientists and members of the lay public make the effort to read, assimilate, understand and replicate our work, by learning how to employ the tools of Aetherometry. No real change will come from governments, corporations, media starlets or angel zillionaires, even if very substantial financial resources are required to bring about aetherometric technologies and support continued aetherometric research in the main disciplines of science. Scientists and lay people, individually or in groups, must bring it about *at their own cost*, just like we did with a very small number of dedicated individuals at ABRI, the Aurora Biophysics Research Institute.

However, as it happened to us in many past instances, we have had to protect in varied ways some parts of this knowledge - whether to insure our own interests, or to prevent potential malignant uses. Nothing would please us more than to openly release all of our work, but holding on to such a view is puerile at best, and impractical in our epoch. For, with knowledge comes the ethical responsibility of protecting people in general, and that very knowledge in particular, from its inevitably oppressive use for the purposes of social power - purposes that were so well exemplified worldwide in the recent Covid crisis: the control of individual behaviour and its massification, whether to replace thought with make-believe fads, to fashion the consumption of commodities, or to unleash censorship, and military and policial repressions, when all else fails. It is social power in all its forms - economic, political, financial, mediatic, policial and military - that must be entirely *repurposed*, from the bottom up, by "well-formed and informed" free agents "armed"

with the real energy science of the Aether. As Ayn Rand so well envisaged, it does not necessarily require the end of capitalism - only the foundation of a different exchange-economy that will not stifle individual creativity and initiative, nor freely speculate on credit with an infinitely indebted and illusory future, so that individual freedom and the right to enjoy life and one's work of a lifetime may at last acquire some concrete meaning and embodiment on this planet.

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