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A nonclassical and nonrelativistic treatment of the so-called de Broglie "Matter-Waves" (1) (The Photoinertial treatment)

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ABSTRACT

The aetherometric analysis of de Broglie waves, as a function of input energy, is presented as a solution that is distinct from the classical and relativistic treatments of wave, momentum and energy functions. The present monograph only addresses the photoinertial treatment, the electroinertial treatment being the subject of a follow-up communication.

> "No model of the electron has been found that reconciles these two apparently discordant viewpoints, the electron as a particle and the electron as a wave."
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> B. Hoag & S. Korff, "Electron and nuclear physics", 1938, p.59.

SHORT INTRODUCTION TO VOLUME III OF AToS

1. Is electric charge always massbound?

We open the third volume of AToS with a basic question to which the *dominant* theories of particle physics and quantum electrodynamics have unequivocally responded "yes". *Minor* theories that in the recent past have regarded charge to be a fundamental property of light leptons ("electrons") - like those of J.J. Thomson or H. Aspden - have attempted to describe other forms of massbound charge as being but light lepton composites. But there have also been poorly known or understood theories that regarded the property of charge as being associated with massless particles - like those of W. Reich or M. Auci. In the latter case [1], the notion of "massless electrons" conjured up the idea that charge could be a massfree property of massbound particles, which would thus simply act as charge carriers.

The problem regarding the relation of the elementary charge to the electron and all other charged mass-bearing particles is not easily explicated. It is, in fact, a complex problem that brings in many subsidiary problems that, in turn, drag in basic questions such as - what is a particle? What is charge? What is the connection of charge to inertia? Are all particles inertial? Are all charges inertial or massbound? How does an electron possess a charge? What is the structure of this electron or the geometry of its energy flux, if any - and what, in that structure or geometry, does charge correspond to?

Further, these questions pull in still more difficult ones - what is a field? How does an electric field accelerate a charged particle? Is there energy associated with a field? How is energy associated with mass? How is energy of motion added to rest energy? Is elementary charge invariant? How does it relate to the inertial linear momentum, or to the angular momentum, of a charge-bearing massbound particle? And so on - all questions, for which, existing physics either has no answer, or the answers it has are wholly insufficient.

If we do not know what exactly charge is, *physically* and as *an energy function*, how can we believe we understand how charge is produced or created - as in pair formation, or any other processes?

O. Lodge thought that charge was a property of the electron (our 'light lepton'), and that the latter was a singularity, a vortex, of the Aether: "The ether being incompressible, and an electron being supposed composed simply and solely of ether, it follows that it cannot be either a condensation or a rarefaction of that material, but must be some singularity of structure, or some portion otherwise differentiated. It might, for instance, be something analogous to a vortex ring, differentiated kinetically - ie by reason of its rotational motion - from the remainder of the ether." [2]

Nearly a century later - are we closer to either prove or disprove his contention?

One might glibly say that 'everyone' now knows that the electron is composed of quarks. But this is a totally unproven assertion. No one has ever cracked open an electron. Just as unproven is the tacit agreement that the electron is *not* composed of 'ether'. Little wonder, since this has become a meaningless notion, and there is no accepted *or cogent* theory of an electric Aether, or of any other Aether - stationary or dynamic - that would condense or rarefy to produce an electron.

Classical physics regarded the electron as a cavity having a definite radius, even though it presented no connection between the geometry of that cavity and the flux of energy, specifically, the flux of energy associated with rest mass. In practical terms, the electron was treated as a point-particle with one dimension, that of mass; thus, it became merely a microscopic point-mass. It is as a point-particle that the Bohr-Rutherford model of hydrogen envisaged the electron as a planet in an orbital around the nucleus.

To the identification of discrete electrons in cathode rays and deflection experiments that indicated their particulate nature, followed the discovery that electrons behaved as waves in reflection

and diffraction experiments, and that - as de Broglie had anticipated - their wavelength was a strict quantum function: $\lambda = h/p = h/mv$. With de Broglie's wavicle theory and the Schrödinger equation, wave mechanics proposed a treatment of the electron as a wave bundle. However, this approach only solidified the paradoxes encountered in the analysis of electric interactions. Is the electron which behaves as a particle, where charge and mass are solidary, the same electron that behaves as a wave bundle? How do diffraction waves analogous to those of light transport mass and charge? Is there equivalence between the so-called "electric" and "magnetic" charges of the electron, either when the latter behaves as a particle or as a wave?

We all know the answers that modern physics - led by particle physics and quantum electrodynamics - gave to some of these questions: the matter-waves and the orbitals turned into waves of probability, all coming down to the chances of intercepting the fabled point-particles, just as the nature of mass and charge became still more obscure.

The fundamental and original answers that our experimental and theoretical approach under the rubrics of "Aetherometry" and "AToS" has generated for these questions have largely been published. We could start from there, and assume that the reader should do some legwork. But we want our present exposition to recapitulate and systematize these answers in a foundational manner, with all the detail required by an investigation into basic physics. For the sake of an introductory overview, we will now summarize the main features of our aetherometric research into the nature of electric charge, but will only examine any of them in depth at the appropriate moment in the sequence of the present volume of AToS.

One of the most striking features of our analysis is the finding that elementary charge is a variant of linear momentum, and, in massbound forms, the property of a certain configuration of rest energy units [3-4]. Another striking feature and even more provocative, is the finding that charge is manifested in both monopolar and ambipolar forms [5-6], and that this accords with whether it is associated with mass or not - that is, according to whether charge presents or lacks inertial effects (mass, inertial linear momentum, etc). Charging (ie electrical polarization) of the simple electroscope, for example, can only be directly produced by a flux of monopolar, massbound charges [5]. We also experimentally demonstrated and formally proved that ambipolar, massfree charges propagate radiatively and conductively [6-7], and that they can act as a field flux (unrectified or rectified) capable of imparting kinetic energy to monopolar massbound charges, and thus set these into motion [4-5,7-8]. We have also proposed that the electron has a definite, finite, geometric structure to its intrinsic energy flux - it is a particular type of energy vortex, a torus, with the property of mass-energy conservation [4,9]. As we will show time again in the course of the present volume of AToS, every mass-bearing particle - or, the same is to say, every particle of Matter - presents a multiform and composite property of linear momentum. Any massbound charge at rest has a property of electric reactivity that it tries to conserve; this property is a form - the electric form - of linear momentum,

what the language of physics calls "charge". But any massbound charge also has a property of inertial reaction, whereby it tries to conserve its rest mass when disturbed - mechanically, electromagnetically, electrically, gravitationally. This second property is a distinct form - the inertial or "photoinertial" form - of linear momentum, that which conventional physics simply calls "linear momentum". Both properties coexist in the same charged particle, and according to how the physical act of detection is conducted, one or the other property, or both (as in J.J. Thompson's experiments with cathode rays, where the charge to mass q/m ratio was measured), are detected. Once in motion, a massbound particle will continue trying to conserve both its electric linear momentum and its mass, by adding to the inertial linear momentum of its rest energy a further inertial linear momentum derived from its kinetic energy - or, to be more exact, derived from the energy composite formed by the juxtaposition of kinetic energy with rest energy.

Ambipolar or massfree charges differ in substantial respects from all massbound charges. Charged massfree particles only have a single form of linear momentum - since they are devoid of mass and thus of its inertial effects. That does not mean that all massfree particles are charged - and, indeed, in previous AToS volumes we have proposed that photons and gravitons are examples of massfree particles devoid of charge [9-11]. According to the above, we may say that, aetherometrically, electric charge is a physical property that exists independently of mass. Thus, unlike Lodge above, we must say that charge exists independently of the energy singularity that constitutes the electron. Electric charge is not necessarily electronic, nor necessarily massbound to any other elementary particle. Yet, we should not make the mistake of a few previous Aether theorists, and dissociate the property of electric charge - for example, in the electron - from the inertial property of mass. If the reference is massbound charge, there is no charge-carrier on one hand, and a 'charge particle' on the other; rather, as we shall amply see, the charge property of an electron is not separable from the (fine) structure of its rest energy, nor from the operation of the latter as a charge-carrier. Therefore, the massfree ambipolar charges that we have experimentally identified should not be confused with the charge property of electrons or of any other massbound particles.

Lastly, none of the above should be viewed as being an impediment to construct a feasible model of how other fundamental particles of Matter may be just composites of negatrons and positrons, even if all such theories proposed so far have not been mathematically and physically consistent in their approaches.

2. Ambipolar electricity and the creation of elementary charge associated with mass

In the preceding, we summarized the essential properties of all electric charges while differentiating them according to whether they are massbound (monopolar) or massfree (ambipolar). Ambipolar electricity is a new domain of physical energy heretofore ignored by existing physics and electrodynamics, despite the fact that the great Nikola Tesla was convinced that "aether electricity"

should be distinguished from "ordinary electricity". Yet, the telltale signs of this ambipolar electricity are strewn everywhere in the edifice of physics, just not systematized and integrated. The action of electric fields is due to ambipolar energy [6-7], and the radiation from a Tesla coil or any other induction coil is ambipolar electricity, not electromagnetic radiation [6-7]. The solar photon spectrum is a local atmospheric byproduct of the spectrum of solar ambipolar radiation [7]. The allotropic cycle of oxygen and water, and the corresponding layering of the atmosphere, including the ozonosphere, are another local byproduct of absorbed solar ambipolar radiation [12]. In still unpublished work, we contend that galactic centers and so-called black holes are also emitters of ambipolar radiation.

Clearly, ambipolar energy is fundamental to electrical, atmospheric and cosmic processes. It is also involved in cosmological and cosmogenic processes. According to the model of subquantum gravity proposed in the previous AToS volume (on "*The Gravitational Aether*"), ultra-high cosmic energy is electrical, ie has the radiative form of ambipolar massfree charge [11]. Its cosmic flux is ordered in the form of a flowing lattice structure with a tremendous unit energy of 10^{31} eV [11]. Cosmological processes of mass-formation are submicroscopically seated on this lattice, in its compression above certain thresholds of energy density. Whatever its cosmological sources and varied pathways, it is in the process of the 'energetic decay' of this cosmic ambipolar lattice that all particles of Matter, together with their associated graviton energy, arise.

The finest element produced ("condensed") by this process is the electron or "light lepton" - together with its phase-energy associated "electron-graviton(s)". As we have suggested, this is the most basic physical process whereby charge becomes associated with mass, and a massbound particle is created with a quantity (a quantum) of mass-energy (ie rest energy). Cosmological creation of electrons and protons from the so-called "vacuum state" - understood as an ambipolar lattice - occurs with a minimum of kinetic energy associated with the created electrons or protons [13]. In the case of the former, release of this kinetic energy is responsible for the production of the mCBR. In the case of cosmological protons, release of their kinetic energy is responsible for the rCBR (radio CBR) that Grote Reber experimentally detected [14-16], and is predictable from our model.

We left out in the above the role of ambipolar energy in biological systems and biochemical reactions [17]. But all this underlines the incompleteness of the existing theories of electricity and electrodynamics. What lies ahead in this volume and the next is both a retracing of the paths that led to the existing concepts and functions of electric charge, and the charting of a new map made up of new paths - those taken by Aetherometry in pursuit of a systematic energy treatment of particle physics and electrodynamics - that revealed unsuspected properties of the concept and the functions of electric charge. With the new tools, it has become possible to treat consistently - in mathematical and physical senses - all electric properties and interactions of particles, whether these are massbound or massfree.

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