An 8 -Year Hiatus in a Realistic SR/QM Theory

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Introduction

It has been eight years since I last presented a paper at these meetings. In this interval, this hiatus, I have published 14 papers and a book on the subject of a realistic version of SR/QM. There have been many clarifications and realistic applications developed in this subject. Since the material is of a dissident nature, an update discussion is most appropriate at this time and includes 15 Figures. The path taken is similar to that of the papers of Prof. John Wheeler. He has in recent years presented informal and colloquial discussions together with many illustrations to give his audience clear digestible views of his ideas, leaving details to his references for those going further.

First, this paper is an informal trip through the three realistic axioms making possible realistic versions of STR/QM. The necessary conceptual and pictorial features of three realistic axioms are applied to the Special theory of Relativity (STR) and to Quantum Mechanics (QM), separately. These generate an instantly understandable and Non-mystical view of physical reality. These axioms should replace standard STR/QM and not thus depend on arcane or tricky reasoning for the justification of STR/QM. Any theoretical and empirical developments of realistic Electromagnetic (EM) and STR/QM subjects are not otherwise worth pursuing.

The three axioms are for Inconsistent Logics, Escher Non-Euclidean Geometries, and Dual Charged Fluids. Capsule versions of each of these and references are included in Section 1-Axioms below. They can all find a home in a reasonable (Boolean), pictorial, and empirically realistic view of nature.

The titles of many of the referenced papers are also listed in Section 2-Comments below because it is necessary to give the reader clear ideas of the phenomenologies of the realistic approaches of the referenced papers. Deriving Discontinuous EM wave Equations from the Quantum Potential[12, 13] is discussed in SECTION 3-Planck's Constant and Discontinuous Electromagnetic Wave Equations from the Quantum Potential. SECTION 4 - Non-Euclidean Geometries concludes this paper (See references [1, 6] and Figs. 6, 7, and 8).

Sections 2 and 3 dices the recent papers which are devoted to realistic phenomenologies permitting for the first time, the derivation of: Planck's Constant, the Complete Self energy of the Electron, and Electromagnetic Wave Equations from the Quantum Potential, and a realistic explanation of the local /non-local conundrum.

Emphasis for the past eight years has been on new phenomenologies, as it should be because they have been neglected/forbidden by the tenets of STR/QM for the past 80+ years. Starting from an expansion of the concept of rest frames it is shown how a realistic phenomenology eliminates conundrums and provides microscopic fluid models in Physics. Operational invariance of STR is retained. Progressive versions of these views have appeared [1-19]. Extensive references are given for the informal discussion and the literal pictorials of physical reality. Late versions of these concepts and many of their details have been discussed in a three-part article[4, 5, 6], a recent book and its review [1, 2,], later papers [10-16, 19], and most papers [1-19] over the past years are also listed. The many enclosed Figures help to provide pictorial views of realistic phenomenologies

SECTION 1-Axioms

The three new axioms are:

a. *Inconsistent Logics:* Inconsistent but realistic logics for QM/STR become instantly clear and obvious even to the layman. This shows, with the help of the Hegelian dialectic, that inconsistency follows from incompleteness and is of a tentative nature.

b. *Escher Non-Euclidean Geometries:* This starts from an expansion of the idea of reference and rest frames and of operational invariance in STR. Non-Euclidean spaces (or frames) can be represented as

Cartesian spaces (having unitary metrics). Different simultaneous representations of (local) particles (like the local photon or local photex) and nonlocal discrete electromagnetic (EM) entities (like the toroidal photex) then become possible depending on the rest frame(See also referemces [1, 6]and Fig. 1.)

c. *Dual Charged Fluids:* Dual charged fluid models consistent with the above then provides realistic pictures of fundamental particles and electromagnetic waves, Figs. 3-9. It illustrates how the electron form is changeable. The electron can be a bubble (when captured by an atom) and a spinning droplet (in free rectilinear motion). In turn, these can generate the two EM entities: first, the photon (a small spherical EM field distribution, i.e., a particle, after a radial gauge transformation) and second the local version of the photex which has a similar discrete nature. The nonlocal photex; is a half-wavelength dipole ring-like expanding discrete electromagnetic field distribution, that Hertz first sketched on the 1880's but as continuous wave assemblies.

Section 2-General Comments

The issues capsulised below show the reader how wide this realistic approach must be to treat the many standard QTR/QM deficiencies. This realistic approach features the following statements:

a. Pictorial views of physical reality become possible, see Figs. 1-15.

b. No piecemeal reconstruction of standard STR/QM, both must change together.

c. The present standard versions of STR/QM are each globally inconsistent and locally consistent.

d. Relativistic invariance is retained based on Builder/Ives/Lorentz rest frame fluidic distortions [20, 21],see Fig. 2.

e. Particle and electromagnetic (EM) wave models are to be constructed from a dual fluidic plenum.

f.   This plenum consists of positive and negative charged microscopically continuous fluids.

g.   The quiescent (and neutral) plenum is the superposition of these two fluids, see Figs. 2-5.

h.   Variations in (plus and minus) fluid density and their velocity fields to be used for particle and wave model construction and electric and magnetic fields derive from the fluidic properties.

i.   A model must consist of exposed equal positive and negative charge distributions of the original plenum and a net velocity field of zero. This makes antiparticles possible by reversing model charge density and velocity fields, see Figs. 2-5.

j.   The energy, E, for setting up the varying charge densities and velocity fields of a model is the agency for the creation of the mass, m, of that model via $E = mc^2$. Thus, a mu meson mass can be modelled on the hydrodynamic flow of a Hills spherical vortex, see Fig. l3, and protons from more complicated flow and charge regimes.

k.   Discussion and references are made[1, 4, 5, 6] to a spinning spherical droplet model of a fluidic electron. Negative charge fills the droplet, which spins in rotational motion and has the equatorial velocity of c. An equal amount of positive charge external to the droplet is distributed radially from which the electrostatic field of the electron derives. The velocity field of this external charge generates the magnetic field which counters the magnetic field of the negative droplet. According to the realistic operational version of STR, the spherical droplet becomes a spinning ellipsoid with its angular momentum vector in the direction of motion. Thus, this flattens in its direction of motion as its velocity increases towards the light velocity, c, in the absolute rest frame[1, 4, 5, 6, 20, 21], like a flying spinning pancake Fig. 2. At the velocity c the pancake has a radius of infinity and is destroyed.

l.   At lower speeds, like 0-20 electron volts the collision of the droplet with a wall generates a single toroidal half wave dipole EM field distribution (a propagating 'smoke ring') and a similar one on rebound from the wall. This is the model for discontinuous fluidic EM waves. All this was sketched in the 1880's by H. Hertz but for continuous EM emission by an electron in rectilinear acceleration and deceleration, Figs. 6-8, 14.

m.   The fluidic point of view permits a natural view that each half wavelength toroidal EM field distribution is taken as a nonlocal discrete entity. This object, dubbed the photex, can appear both in nonlocal and local forms. This is treated using EM (conceptual) rest frames. A finite number of these entities would then constitute a wave train, eliminating the mathematical Fourier continuous and infinitely extended functions in space and time. The space-time continuum is retained, however, and it becomes the arena for realistic and pictorial phenomena, Figs 1-8, 11.

n. A Helmholtz essay[22] and an engraving by Escher[23] supplies a basis for a realistic view of Non-Euclidean space which permits extensions of rest frames to give both a realistic view of the nonlocal and local photex. It allows the quite realistic mapping of a toroid (the obviously Nonlocal photex in a doubly connected space) to a local version of the photex (which is the spherical local photex in a singly connected space) and vice versa. One can generate both local and nonlocal rest frame versions of the photex, in this way, Figs. 6, 7, 8.

o. The electron is a spinning droplet in rectilinear motion but is a bubble in atomic capture when it surrounds the nucleus, Fig. 9, supporting a realistic non-QM view of the nature of captured electrons.

p. The realistic approach has made it possible for the first time to actually derive Planck's constant, h, directly from Larmor's radiation formula and the physical properties of the photex [11, 19c,] . The complete self-energy of the electron has also been found in a similar manner[11, 19c], Figs. 7, 8.

q. Electron lifetime in the Dehmelt Isolated Electron apparatus is closely estimated, See Fig. 12.

SECTION 3-Planck's Constant and Discontinuous Electromagnetic Wave Equations from the Quantum Potential

Some further words must be said about the charged fluid approach relevant to h and to the fluid models for the electron and for discrete electromagnetic dipole waves. The basic concept involves replacing the QM paradigm with a realistic dual fluid plenum consisting of continuous positive and negative fluids. These give a neutral vacuum space and permits fluid models of the canonical particles and electromagnetic waves (mainly dipole waves which form the basis for all electromagnetic waves). Relativistic invariance is retained, on an empirical and realistic basis.

The fluid model for the electron is a negative spinning droplet surrounded by equal amounts of positive fluid, which characterise the fields and all other qualities of the electron. The fluidic realistic model electromagnetic wave is discontinuous. It is the half wavelength dipole field distribution which is treated as a discrete independent entity. It has been named the "Photex" and is the origin of all QM phenomena. Converting all these phenomena to fluid models makes possible the realistic description for electromagnetic radiation from the fluidic electron model, Figs. 6-9, 14.

Electromagnetic wave generation consists of the shedding of a toroidal vortex in either positive or negative fluid (like a smoke ring) which then evolves very much as per the sketches first given by Hertz of dipole waves. This vortex shedding occurs upon the acceleration or deceleration of the fluidic electron models, principally in collisions. For discrete EM emission the fluidic electron is pictured 'like a tennis ball', See Fig. 8, which rebounds back and forth between two walls. A 'Photex' is emitted by the electron when it collides with the wall giving it a momentary deceleration to zero velocity and then another 'Photex' (of opposite charge and spin) upon its rebounding acceleration and velocity in the opposite direction. The meaning for h (or rather h/2) has been shown to permit an estimate of the energies of each of these 'Photex pairs' of the order of about 10^{-15} eV. Thus, the decrement of energy for each collision of the moving electron is very small unless the number of such collisions is extremely large (like 10^{+15} collisions for a 1 eV decrement in the energy of the moving electron). The 10^{-15} eV comes from the fact that the units of h are electromagnetic (EM) energy per cycle per second in our physical rest frames. Our only experience with EM energy is in physical frames where EM energy always moves with the speed c, even as standing waves where the EM energy rebounds between obstacles. In a conceptual EM rest frame, however, the units of h are in energy per cycle because time does not exit in such a rest frame. When the energy is expressed in electron volts (eV), then h in a physical frame about 10^{-15} eV/cycle per second whereas h in the EM conceptual rest frame is 10^{-15} eV per cycle (a curious but useful idea). Applying this 'Photex' idea to the well-known Larmor radiation equation shows how h derives from it, but with a 24% difference due to some inaccuracy in the incident and rebound electron energy, see Figs. 10, 11, 12.

The self-energy of the realistic spinning droplet electron model follows simply from summing the estimates of the electrostatic and magnetic fields of the fluidic electron model.

The rebounding tennis ball example alluded to above provides the example for the application of the well-known Quantum Potential to be equated to the rebound energy in its Planck's law form, $E = hf$. This equates the forms [(Laplacian of u)/u] or [(D'Alembertian of u)/u] to spatial or space-time

waves, respectively, which are solutions of the respective Laplacian or D'Alembertian EM wave equation. Here u is, of course, the wave function variable. Thus, the EM wave equation is derived from the Quantum Potential being treated here is a single discontinuous half wave dipole field configuration.

SECTION 4 - Non-Euclidean Geometries

The famous Escher print [23], "Hand with Reflecting Sphere", was drawn in 1935. Sixty-Five years earlier, in 1870, Helmholtz wrote about this in the paper[22], "On the Origin and Significance of Geometrical Axioms". The relevant portion, is here reproduced (See also references [1, 6]):

"Let me first remind the reader that if all the linear dimensions of other bodies, and our own, at the same time were diminished or increased in like proportion, as for instance to half or double their size, we should with our means of space perception be utterly unaware of the change. This would also be the case if expansion or contraction were different in different directions, provided our own bodies changed in a like manner, [and similarly for rotation].

Think of the image of the world in a convex mirror. The common silvered globes set up in gardens give the essential features. A well-made mirror of moderate aperture represents the objects in front of it as apparently solid and in fixed positions behind its surface. But the images of the distant horizon and the sun in the sky lie behind the mirror at a limited distance, equal to its focal length. Between these and the surface of the mirror are found the images of all the other objects before it, but the images are diminished and flattened in proportion to the distance of their objects from the mirror. Yet, every straight line or plane in the outer world is represented by a 'straight line' or 'plane' in the image.

The image of a man measuring with a rule a straight line from the mirror would contract more and more the farther he went from the surface of the sphere. With his shrunken rule, however, the man in the image would count out exactly the same number of centimetres as the real man. And in general all geometric measurements of lines or angles made with regularly varying images of real instruments would yield exactly the same results as in the outer world, all congruent bodies would coincide on being applied to one another in the mirror as in the outer world, all lines of sight in the outer world would be represented by 'straight' lines of sight in the mirror.

In short, I do not see how men in the mirror are to discover that their bodies are not rigid solids and their experiences not good examples of Euclid's axioms. But if they could look out upon our world as we can look into theirs, without overstepping the boundary, they must declare it to be a picture in a spherical mirror and would speak of us just as we speak of them. If two inhabitants of the different worlds could communicate with one another, neither, as far as I can see, would be able to convince the other that he had the true, the other the distorted relations."

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FIGURES

Capsulised titles. Fuller description given in each Figure.

Figure 15   The Rolling Up of a Vortex