PROBLEM SOLVING VACUUM QUANTA FIELDS

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ABSTRACT

Physics of the vacuum quanta is characterized by general solutions using algebraic equations by applying specific functional form of energy to previously developed model ansatz generalized Hamiltonian quantum mechanics of vacuum quanta formalism. Specific functional form of energy having attractive-repulsive terms were applied quantitatively involving complex transcendental components. Physical analysis of these equations gave insight on the workings of these equations on signals. These equations were graphed to yield functional signal forms of the partial differential equations, showing how the output of the functional signal forms reveal features of a digital-like pulses propagating waveform that are indicative of time evolution generators.

To gain an understanding of the sizes of these entities, zero-point spring constants were calculated from the well-known physics of zero-point energy, monopole mass, and harmonic oscillator relationships. Analytical interpretation of above computations showed that depending on monopole mass, entity sizes with zero-point gradient energy of 10^{26} metric units might correspond to sizes of these entities less than that of electrons-positrons and Bohr atom, typically 10^{-20} m versus 10^{-15} m or 10^{-18} m. sizes. With monopole mass value reducing closer to 10^{-47} kg with time-evolution, continuous propagation of generators, assisted by photon mediators will be expected to create quarks, antiquarks, & gluons.

Graphical plots also translate from all these equations, showing signal patterns and equivalent wave velocity in magnetic vortex vacuum quanta. They reveal observables that point to superstructure like crystal physics, manifesting certain internal structure of dynamic cosmological genesis with possibility of a superluminal signal space-time.

Keywords: *magnetic vacuum quanta, signal simulations magnetoelectric oscillatory plasmoids, observables, problem solving attractive-repulsive energy fields, pulsed digital-like propagating waveform, equivalent wave velocity in magnetic vortex vacuum quanta, superluminal signal vacuum quanta.*

1. INTRODUCTION

Generalized formalism with Hamiltonian operator showed analytically rigorous quantifications with partial differential equations, characterizing dynamics of the zero-point and microblackhole source-sink mechanisms [1]. A review about global efforts with searches for monopoles were highlighted, especially of spin-ice and Bose-Einstein condensate experimental measurements with observations of possible monopoles and their detection attempts [1].

Author's peer reviewed publication as a coauthor with Emmanouil Markoulakis [2] reported results of real time observations of magneton as a fundamental entity of field existence. Observables were also identified theoretically, which were experimentally measured by observations of the magneton and the unipole with the Ferrocell assembly of synthetic magnetic macroscopic arrays [2, 3, 4]. Additionally, articles relating to how theoretical observables versus experimentally observable measurements [3] would be analyzable were emphasized, based on quantum mechanical formulations of a quantum relativity operator physics metrics consisting of wavefunctions, stress-energy-tensor, signal/noise, topology of quagmire magneton mechanism, identifiability of observables versus observational parameters, and quantum computing dimensionality aspects [3].

Generalized formalism with Hamiltonian operator physics [1] derivations of zero-point microblackhole eigenfunctions analytically revealed that the vacuum fields energy may have values of higher order of magnitude, typically 10^{26} metric units possible at quantum zero-point like situations that might be encountered at inflationary vacuum genesis, whose characteristic energies are well known in physics literature listed elsewhere [1]. In partial

differential equations (43) & (46) [1], authors were able to infer these aspects as well as provide an insight through micro-blackhole general solutions configuring eigenvalues eigenfunctions "fields" partial differential equations. Analytical results revealed that these quantum entities behave like the relativistic physics considered by various scientists worldwide about micro-blackholes, as listed physics literature [1], especially noting that time aspect (t_f - t_i) could be quite analogous to real and proper time, with field up and down differentially changing spatially with relativistic systems. Also, notable were special requirements with rotational fields, $\mathcal{E}_r$, both up and down indices needing positive values due to logarithmic functionality, i.e., $\ln|\mathcal{E}_r^{\mu\nu}|$ and the apparent symmetry with 2nd order, 1st order, & the 0th order differential terms, per differential equations (32), (43), & (46) [1].

Further, possibilities with analytical interpretations, surprisingly evident in mathematical general solutions are borne out of this non-assumptive pure theory, primarily based on physics model of vacuum field quanta [1 - 4] is shown to be extendable eventually to complete analysis of a superluminal signal vacuum space model. Presently this work is in progress with international group to grand unify fields, explaining all currently known phenomena of dark energy, dark matter, real matter, real energy with all the four fundamental forces, thus accounting totally for seemingly enormous almost huge even infinite energies possessed by the natural universe. A brief overview with generalized Hamiltonian vacuum quanta vacuum space operator physics formalism results have been revealed separately [1].

1.1 Highlights of generalized Hamiltonian derivational formalism of the zero-point microblackhole energy fields partial differential equations [1] applicable to specific fields.

In this paper, physics operating vacuum space quanta is characterized to obtain general solutions by having input to be the functional form signal of the oscillatory vortex fields, rationalized earlier [1]; here, these fields are exemplified to specific case of the fields with attractive and repulsive forces. Author will show how the output of the functional form signal of the oscillatory fields will reveal features surprising of pulsed, digital-like signals propagating waveform. To start this analysis, author will examine Energy Fields Partial Differential Equations [1], specifically fields known to follow typically inverse square law as well as an inverse cubic law for example, per physics literature [5]. We can apply these to differential equations already developed - Equations (32), (43), & (46) [1] - to analyze functional fields having high energy densities to initiate generation of quasi-particles and/or particles within vacuum quanta and then what and how the signal output will be generating such sequences. Here, in this paper, however, there will not be any extended conclusions of quantum field theory with Standard Model particle analysis. Such analysis sequentially will be undertaken at ongoing project work, with subsequent publications. Author is presently working collaboratively with scientists to provide proof of high energy creations within superluminal vacuum quanta - to sustain almost the infinite energy of universe - having geodesics as well as non-geodesic matter universe. Further, author hopes to embark on problem solving mathematical physics formalisms within the framework of generalized Hamiltonian operator analysis elsewhere presented [1], extending vacuum quanta analysis to superluminal vacuum space systems modeling capable of explaining paradoxical nature with matter, antimatter, dark matter, dark energy, and the creation of stable geodesics within galactical star systems sustaining live cosmos.

To continue with analysis, generalized Hamiltonian operator quantum relativity formalism derived elsewhere [1] can be summarized, thereby noting defined symbols E_g: zero-point gradient energy; $\boldsymbol{\mathcal{E}_r}$: Helmholtz decomposition rotational field; $\boldsymbol{\mathcal{E}_g}$: Helmholtz decomposition gradient field; $\boldsymbol{_{\mu\nu}}$, $\boldsymbol{^{\mu\nu}}$ are lower and the upper indices that will denote referential frame tensor calculus notations; c: speed of light in vacuum; ħ: Planck's constant, $h/2\pi$; and (t_f - t_i): time evolution of the rotational eigenfields [1]. Partial differential equations, thus characterizing zero-point and the microblackhole entities have been given by [1]:

(i) Zero_point Hamiltonian operator eigenfields tensor zero_point gradient differential equations energy gradient fields are given by [1]:

$$\nabla^3 E_g^{\mu\nu}.\nabla^2 E_{g,\mu\nu} = [(2\text{-}ic\hbar)/ic\hbar]\nabla^3 E_{g,\mu\nu}.\nabla^2 E_g^{\mu\nu} \quad (1)$$

(ii) microblackhole Hamiltonian operator eigenfields rotational tensor microblackhole differential equations with Helmholtz rotational fields are given by [1]:

$$\nabla^2 \mathcal{E}_{r,\mu\nu} - \{i(t_f - t_i)/\hbar\}[\mathcal{E}_{r,\mu\nu}(1+\ln|\mathcal{E}_{r,\mu\nu}|]^{-1}(\nabla\mathcal{E}_{r,\mu\nu})^2 + \{i(t_f - t_i)/\hbar\}[\mathcal{E}_{r,\mu\nu}/(1+\ln|\mathcal{E}_{r,\mu\nu}|] = 0 \quad (2.1)$$

$$\nabla^2\mathcal{E}_r^{\mu\nu} - \{i(t_f - t_i)/\hbar\}[\mathcal{E}_r^{\mu\nu}(1+\ln|\mathcal{E}_r^{\mu\nu}|]^{-1}(\nabla\mathcal{E}_r^{\mu\nu})^2 + \{i(t_f - t_i)/\hbar\}[\mathcal{E}_r^{\mu\nu}/(1+\ln|\mathcal{E}_r^{\mu\nu}|] = 0 \quad (2.2)$$

2. PROBLEM SOLVING ENERGY FIELDS PARTIAL DIFFERENTIAL EQUATIONS PROCEDURES

Equations (1), (2.1), & (2.2) represent fields partial differential equations with having the zero-point vacuum gradient energy and the microblackhole rotational field mathematical physics. One of the ways that physics of the vacuum quanta are hence characterized to spatially varying solutions will be to exemplify the functional form of the energy and that of fields – basically known to have attractive & repulsive forces [5, 6] – with these combined fields varying with distance as an inverse square and/or an inverse cubic relationally. These are worked out in detail quantitatively, as shown below.

Exemplifying solutions with specific form of combined attractive and the repulsive forces having quagmire vacuum quanta [1] can be equated as usually employed summations of algebra of typical proportionality of 1/r^2 and 1/r^3, where r is the distance action of field exerting force. Using the standard original definitions of the field to be equal to spatial differential of the force, the energy functional form may be written having combined form like $E = k_\alpha/r + k_\rho/r^2$; this will be substituted parametrically in the partial differential Equation (1) with constants of k_α and k_ρ getting proper signs as solutions are worked out, by substituting and computing differential equations (1), (2.1), & (2.2) mathematically; these exercises are thoroughly shown below. Our understanding of the behavior of differential calculus of algebraic functions helps us to deduce analytically differential solutions of the fields; for example, differentiating from energy to force to field, process of differentiation must go up to 2nd order with respect to space, referring to Equations (2); such differentiations then will produce polynomial terms up to an inverse-6th power of "r" within Equations (2), meaning 4 roots are to be expected. Again, these are algebraically rationalized easily knowing variationally that to arrive from the energy to the field parameter, energy terms will have to be differentiated twice with respect to space, as noted above based on the classical standard definition of field. Therefore, we may surmise that the field-distance equation will have to be written as: $\mathcal{E} = k_3/r^3 + k_4/r^4 + k_5/r^5 + k_5/r^6$ to enable algebraically substituting specifically this functionality into partial differential Equations (2.1) & (2.2). Applying standard procedures, permutating through the constants to take care of generality aspects and then solving for these constants per polynomial algebraical mathematics will make it rigorously sound mathematical physics. Just to mention here additionally, in performing extensive mathematical analysis of the physics [7-10] for the vortex mechanics, two spatial variables, r_r: radial & r_z: z-axis perpendicular distances have to be represented all in spherical polar coordinates, describing the vortex like hydrodynamic situations, besides two rotational angle variables: Θ, and ϕ in general. To keep analysis simpler in the present context, extended complex situations with vortex hydrodynamics of microblackhole will not be considered here.

With zero_point vacuum, there will be two solutions using energy equation $E = k_\alpha/r + k_\rho/r^2$ as a function of inverse distance terms. Typically, within the partial differential Equation [1], it will have polynomial terms to 4th-inverse power of r; hence 3 roots are to be expected for energy consisting of potential and/or kinetic terms. We will hereafter refer to combined fields as "fields". Mathematical techniques widely used for physical sciences are adapted here to solve problems algorithmically that are translatable to graphing techniques, which are essentially useful to the quantum physical solutions with explainable physics [7-13].

2.1 Problem Solving Equation (1) zero_point with having energy function of the form with attractive-repulsive energy field constants, following above explanations, with results:

$$E_g^{\mu\nu} = k_\alpha{}^{\mu\nu}/r_g^{\mu\nu} + k_\rho^{\mu\nu}/r_g^{\mu\nu\wedge}2, \text{ and } E_{g,\mu\nu} = k_{\alpha,\mu\nu}/r_{g,\mu\nu} + k_{\rho,\mu\nu}/r_{g,\mu\nu\wedge}2$$

Solutions after substituting these values of energies to partial differential Equations (1):

$$(k_\alpha{}^{\mu\nu}/r_g^{\mu\nu\wedge}4 + 4k_\rho^{\mu\nu}/r_g^{\mu\nu\wedge}5)(k_{\alpha,\mu\nu}/r_{g,\mu\nu\wedge}3 + 3k_{\rho,\mu\nu}/r_{g,\mu\nu\wedge}4) =$$

$$[(2\text{-}ic\hbar)/ic\hbar](k_{\alpha,\mu\nu}/r_{g,\mu\nu\wedge}4+4k_{\rho,\mu\nu}/r_{g,\mu\nu\wedge}5)(k_\alpha{}^{\mu\nu}/r_g^{\mu\nu\wedge}3+3k_\rho^{\mu\nu}/r_g^{\mu\nu\wedge}4) \quad (3)$$

Imposing conditions with systems of conservative fields zero_point gradient [7]:

- Energy fields up and down coefficients will be same – symmetric systems:
  $k_\alpha{}^{\mu\nu} = k_{\alpha,\mu\,\nu} = k_\alpha$ Condition 3.1

|||ly, fields up & down coefficients $k_{\rho}{}^{\mu\nu} = k_{\rho,\mu\nu} = k_{\rho}$ Condition 3.2

- Additionally, gradient distance spatially up and down will be same – symmetric systems: $r_g{}^{\mu\nu} = r_{g,\mu\nu} = r_g$ Condition 3.3

Getting resulting solutions of algebraic Equations (3) after applying Conditions 3.1, 3.2 & 3.3:

$$k_{\alpha}^2 r_g^3 + 7k_{\alpha}k_{\rho} r_g^2 + 12k_{\rho}^2 r_g = 0 \quad (4)$$

$r_g = 0$ will not be a viable solution since conservative vacuum space quanta energy fields are not infinite [7]. Therefore, roots of r_g are:

$$[r_g] = \{-3k_{\rho}/k_{\alpha}, -4k_{\rho}/k_{\alpha}\} \quad (4.1)$$

With root $[r_g] = -3k_{\rho}/k_{\alpha}$, we can show zero_point gradient energy to be $E_g{}^{\mu\nu} = E_{g,\mu\nu} = E_g$, due to conservative fields conditions 3.1, 3.2, & 3.3 with energy function form, $E_g = k_{\alpha}/r_g + k_{\rho}/r_g\text{^}2$; so,

$$E_g = (-2/9)(k_{\alpha}^2/k_{\rho}) \quad (5)$$

|||ly, root $[r_g] = -4k_{\rho}/k_{\alpha}$ will give:

$$E_g = (-3/16)(k_{\alpha}^2/k_{\rho}) \quad (5.1)$$

Interpretations: Typically, the energy field coefficient, k_{ρ}, has a positive sign whereas, the energy field coefficient, k_{α}, has a negative sign to denote attractive versus repulsive fields [14-16]. In Equations (5) & (5.1) zero-point gradient energy, E_g, will have positive values; therefore, that will point thus to inflationary high energy of 10^{26} metric units outwards, as noted per reference [1], based mathematically on the nature of up and down energy values; evaluation of the constant in Equation (1), i. e., $[(2\text{-}ic\hbar)/ic\hbar] \approx$ value of order 10^{26} energy value, numerically conjugating as metric units.

2.2 Problem Solving Equations (2.1) & (2.2) with microblackhole fields function [1], with results:

$\mathcal{E}_{r,\mu\nu} = k_{3,\mu\nu}/r_{\mu\nu}\text{^}3 + k_{4,\mu\nu}/r_{\mu\nu}\text{^}4 + k_{5,\mu\nu}/r_{\mu\nu}\text{^}5 + k_{6,\mu\nu}/r_{\mu\nu}\text{^}6$, per above argument, obtaining results:

Solutions with this value of $\mathcal{E}_{r,\mu\nu}$ substituted onto Equation (2.1) listed above (per [1]) will give:

$$(12k_{3,\mu\nu}/r_{\mu\nu}\text{^}5 + 20k_{4,\mu\nu}/r_{\mu\nu}\text{^}6 + 30k_{5,\mu\nu}/r_{\mu\nu}\text{^}7 + 42k_{6,\mu\nu}/r_{\mu\nu}\text{^}8) - \{i(t_f - t_i)/\hbar\}[(k_{3,\mu\nu}/r_{\mu\nu}\text{^}3 + k_{4,\mu\nu}/r_{\mu\nu}\text{^}4 + k_{5,\mu\nu}/r_{\mu\nu}\text{^}5 + k_{6,\mu\nu}/r_{\mu\nu}\text{^}6)\ (1+\ln|(k_{3,\mu\nu}/r_{\mu\nu}\text{^}3 + k_{4,\mu\nu}/r_{\mu\nu}\text{^}4 + k_{5,\mu\nu}/r_{\mu\nu}\text{^}5 + k_{6,\mu\nu}/r_{\mu\nu}\text{^}6)|]^{-1} - (3k_{3,\mu\nu}/r_{\mu\nu}\text{^}4 + 4k_{4,\mu\nu}/r_{\mu\nu}\text{^}5 + 5k_{5,\mu\nu}/r_{\mu\nu}\text{^}6 + 6k_{6,\mu\nu}/r_{\mu\nu}\text{^}7) + \{i(t_f - t_i)/\hbar\}[(k_{3,\mu\nu}/r_{\mu\nu}\text{^}3 + k_{4,\mu\nu}/r_{\mu\nu}\text{^}4 + k_{5,\mu\nu}/r_{\mu\nu}\text{^}5 + k_{6,\mu\nu}/r_{\mu\nu}\text{^}6)\ (1+\ln|(k_{3,\mu\nu}/r_{\mu\nu}\text{^}3 + k_{4,\mu\nu}/r_{\mu\nu}\text{^}4 + k_{5,\mu\nu}/r_{\mu\nu}\text{^}5 + k_{6,\mu\nu}/r_{\mu\nu}\text{^}6)|] = 0 \quad (6)$$

Simplifying Equation (6) by letting:

$$w_{\mu\nu}(r) = \{i(t_f - t_i)/\hbar\}[(k_{3,\mu\nu}\, r_{\mu\nu}\text{^}5 + k_{4,\mu\nu}\, r_{\mu\nu}\text{^}4 + k_{5,\mu\nu}\, r_{\mu\nu}\text{^}3 + k_{6,\mu\nu}\, r_{\mu\nu}\text{^}2)\ (1+\ln|(\ k_{3,\mu\nu}/r_{\mu\nu}\text{^}3 + k_{4,\mu\nu}/r_{\mu\nu}\text{^}4 + k_{5,\mu\nu}/r_{\mu\nu}\text{^}5 + k_{6,\mu\nu}/r_{\mu\nu}\text{^}6)|] \ \&$$

$$q_{\mu\nu}(r) = -3k_{3,\mu\nu}\, r_{\mu\nu}\text{^}4 + 4(3k_{3,\mu\nu} - k_{4,\mu\nu})r_{\mu\nu}\text{^}3 + 5(4k_{4,\mu\nu} - k_{5,\mu\nu})r_{\mu\nu}\text{^}2 + 6(5k_{5,\mu\nu} - k_{6,\mu\nu})r_{\mu\nu} + 42k_{6,\mu\nu}$$

then, algebraically manipulating Equation (6) yields results, with simplifying defined symbols:

$$[w_{\mu\nu}(r)]^2 + q_{\mu\nu}(r)\, w_{\mu\nu}(r) + (t_f - t_i)^2/\hbar^2 = 0 \quad (6.1)$$

|||ly, analyzing $\mathcal{E}_r{}^{\mu\nu} = k_3{}^{\mu\nu}/r^{\mu\nu}\text{^}3 + k_4{}^{\mu\nu}/r^{\mu\nu}\text{^}4 + k_5{}^{\mu\nu}/r^{\mu\nu}\text{^}5 + k_6{}^{\mu\nu}/r^{\mu\nu}\text{^}6$ will provide algebraically.

Solutions with having these $\mathcal{E}_r{}^{\mu\nu}$ values substituted to P. D. Equation (2.2) will provide results:

$$(12k_3{}^{\mu\nu}/r^{\mu\nu}\text{^}5 + 20k_4{}^{\mu\nu}/r^{\mu\nu}\text{^}6 + 30k_5{}^{\mu\nu}/r^{\mu\nu}\text{^}6 + 42k_6{}^{\mu\nu}/r^{\mu\nu}\text{^}8) - \{i(t_f - t_i)/\hbar\}[(k_3{}^{\mu\nu}/r^{\mu\nu}\text{^}3 + k_4{}^{\mu\nu}/r^{\mu\nu}\text{^}4 + k_5{}^{\mu\nu}/r^{\mu\nu}\text{^}5 + k_6{}^{\mu\nu}/r^{\mu\nu}\text{^}6)\ (1+\ln|(k_3{}^{\mu\nu}/r^{\mu\nu}\text{^}3 + k_4{}^{\mu\nu}/r^{\mu\nu}\text{^}4 + k_5{}^{\mu\nu}/r^{\mu\nu}\text{^}5 + k_6{}^{\mu\nu}/r^{\mu\nu}\text{^}6)|]^{-1} - (3k_3{}^{\mu\nu}/r^{\mu\nu}\text{^}4 + 4k_4{}^{\mu\nu}/r^{\mu\nu}\text{^}5 + 5k_5{}^{\mu\nu}/r^{\mu\nu}\text{^}6 + 6k_6{}^{\mu\nu}/r^{\mu\nu}\text{^}7) + \{i(t_f - t_i)/\hbar\}[(k_3{}^{\mu\nu}/r^{\mu\nu}\text{^}3 + k_4{}^{\mu\nu}/r^{\mu\nu}\text{^}4 + k_5{}^{\mu\nu}/r^{\mu\nu}\text{^}5 + k_6{}^{\mu\nu}/r^{\mu\nu}\text{^}6)\ (1+\ln|(k_3{}^{\mu\nu}/r^{\mu\nu}\text{^}3 + k_4{}^{\mu\nu}/r^{\mu\nu}\text{^}4 + k_5{}^{\mu\nu}/r^{\mu\nu}\text{^}5 + k_6{}^{\mu\nu}/r^{\mu\nu}\text{^}6)|] = 0 \quad (6.2)$$

Simplifying with applying symmetry principle of indices, analogous to Equation (6.1), arrive at:

$$[w^{\mu\nu}(r)]^2 + q^{\mu\nu}(r)\, w^{\mu\nu}(r) + (t_f - t_i)^2/\hbar^2 = 0 \qquad (6.3)$$

appropriately letting $w^{\mu\nu}$ & $q^{\mu\nu}$ to define like in Equation (6.1), having proper upper indices for $k_i{}^{\mu\nu}$ and $r^{\mu\nu}$ representations, applicable to i = {3,4,5,6}in k_i constants (6.4)

Interpretations: Going through mathematics, logical interpretations will give insights to notice that Equations (6.1) & (6.3) contain nonlinear transcendental functions with $w_{\mu\nu}(r)$, $q_{\mu\nu}(r)$, $w^{\mu\nu}(r)$, & $q^{\mu\nu}(r)$ parameters; hence, these algebraic equations will not have closed-form solutions, but only computational solutions by adopting numerical methods. Alternative mathematical techniques may involve methods applying linearization procedures of polynomial algebraic manipulations using logarithmic series expansions, approximated to certain terms, then solving with iterative methodology. In this paper, these methodologies will not be considered further to keep simplicity to analyze primarily physics aspects.

2.3 Insights gained by logical analyses of algebraic solutions, with results:

Highlighting inner workings of Equations (6.1) & (6.3) will bring out features essential in understanding physics operating these processes. Since these equations are algebraic, no singularities or otherwise unsolvable complexities will be expected and there are many important general revealing inferences possible out of these equations. Some of these inferences provide knowledge of especially complex nonconservative fields that are pointing to a functionally nonlinear nature, with synergistic effects of localizing vortex fields generating high energy density. Ansatz with algorithmic graph theory, partial differential equations quantified above translates onto graphic schematics within the figures that follow here, highlighting signal output schemes that seem like analog input signal of vortex fields outputting typical digital output pulsed signals.

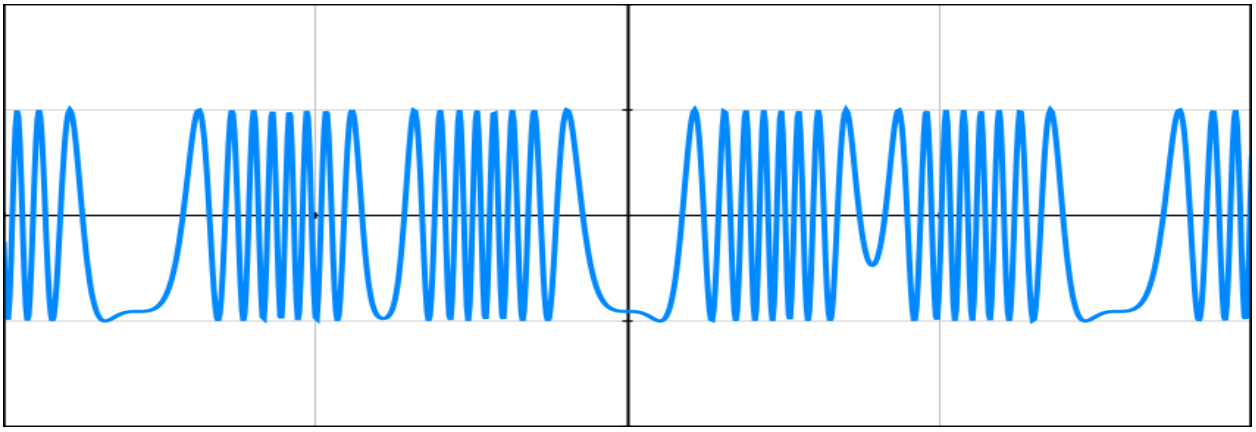

Figure 1: Graphing vortex generating sinusoidal pulsed signal output. Input X: function vortex; Y: sinusoidal (function of X) having output signals, with input per theoretical analyses modeling [1], using especially vortex form per graph in Figure 6 [2], and the google templates [17].

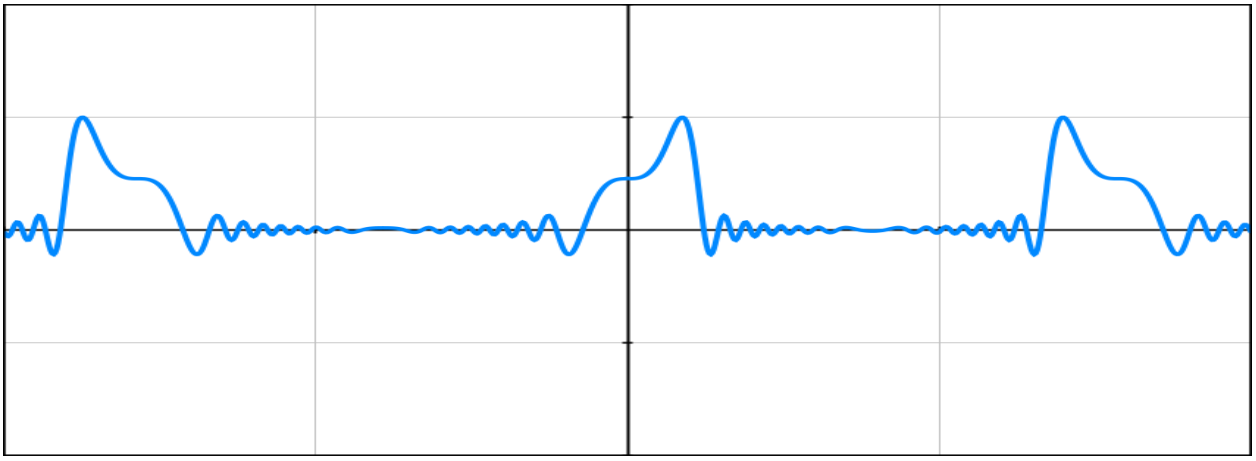

Figure 2: Analytically graphing the value of "r" & distribution profile of typical equivalent wave velocity in vacuum space vortex quanta, using values of the electric constant = 8.85418782×10^{-12} m^{-3} kg^{-1} s^4 A^2, and magnetic constant = $1.25663706 \times 10^{-6}$ m kg s^{-2} A^{-2}, applied to the Figure 1 signals, per theoretical analyses [1], utilizing google templates [17].

3. INTERPRETATIVE DISCUSSIONS PROCEEDING RESULTS OBSERVABLES COMPUTING

The zero_point microblackhole, that subsequently generate sinusoidal pulsed signal output characterized analytically by the partial differential Equations (6) through (6.4) are schematically profiled signals per Figure 1, that shows graphing of pulses created out of vortex quanta with having input X: function vortex quanta, especially functional form of the vortex graphed per Figure 6 [2]. Reiterating above, these have output Y: sinusoidal function of X, with output signals effect of input of (X) vortex form into typical EM sinusoidal waveform characteristic of the zero-point fluctuations [11-13], per theoretical analyses modeling so far [1]. In subsequent papers, author will show with collaborative work of associated scientists that these fields pulse manifest quantum characteristics of compressed signal waves, signifying condensed matter quanta or fermionics/bosonics, electrons-positrons particles, and/or phonons-photons within superluminal vacuum quanta; wave propagation occurring through a nonlinear complex manner throughout. It is worthwhile noting that normal zero-point fluctuations will be sinusoidal [11-13]; however, the change or modulation is due to the vortex action of the fields, as illustrated by observed measurements within the Figure 1 [1] graph, analytical reproduction of real time observed measurements of magneton patterns of Figure 6 [2]. Surprisingly, these results are purely stitched pattern output of fundamental model established by considering vacuum quanta quagmire Hamiltonian operator physics with ansatz general theoretical formalism quantum physics [1]. Hence, independently theory has brought out patterns that are manifested quite adequately with experimental measurements. Furthermore, analyses of these phenomena, with identified observables verified by experimental measurements will be considered extensively further in subsequent papers. Presently in this paper, analytical interpretations will be quantitatively examined more below.

Typical superstructure like crystal physics, apparently evident in the signal pattern per Figure 1 seems to reveal certain internal structure of how dynamic cosmological genesis may be happening; this quagmire model has ability to bring about observables to verify that. High energy density associated to zero-point vacuum energy 10^{26} metric units or more mentioned [1] has been verified here numerically having results of positive energies per the Equations (5) and (5.1), as also Equations (6.1) and (6.3); these are inferable, noting specifically with reference to $w^{\mu\nu}$ & $q^{\mu\nu}$ term. Additionally, these are analytically showing complex transcendental functionality pointing to quantum mechanically possible non-Hermitian Diracian like situations [9, 12]. Legendre type transformations, to derive typical velocity matrix may be appropriate, for example with having the fields transformed to domain of Hamiltonian-momentum to infer velocity as its slope [18]; such calculations will reveal exotic characteristics by showing whether such superluminal vacuum space possessing faster than the speeds of light are achievable within the vacuum quanta, unit of the fabric of vacuum space [1], due to vortex fields generating signal pulses, like shown per Figure 1 to evolve out of a possible quagmire infinite energy. In this paper, Legendre type transformation is not considered here, again for simplicity, concentrating instead on the physics aspects; however, typical analysis with

the motion of charge encountered in normal electric and magnetic standard fields with analytical computations will be considered here, estimating velocity of entity generated out of vortex within vacuum quanta [1], depicted here.

A typical analysis with graphing of field to velocity is shown per Figure 2, having the calculation of velocity in field equation of motion $\mathbf{Ɛ} = \mathbf{v} \times \mathbf{B}$ [19-25], by applying quantum equivalence equation of $\hbar\omega = E_g = (-3/16)\ (k_\alpha^2/k_\rho)$, which is the value given by Equation (5.1). Also, considering attractive-repulsive forces, magnetic charges per physics literature [14-16] are same as Coulombic type of interaction, with k_α and k_ρ values equal to Coulomb's constant $k_e \approx 8.988\times10^9\ N\cdot m^2\cdot C^{-2}$ [14-16]. The signal output in Figure 1 with electrics field, Ɛ is mathematically metrically equivalent to sin(X), with X: vortex signal of **B**. One can then get equivalent wave velocity, like shown per Figure 2 with phase angle orthogonality of **Ɛ**, **v** & **B**. Insight into the signal pattern can be gained by noticing comparatively typically two orders of value difference occurring in highest profile versus the lowest profile velocities - the highest velocity computed to be about an order of magnitude greater than speed of light, i.e., superluminal, whereas the lowest velocity maybe about one order magnitude lower for subluminal velocity. In between the highest and lowest profile velocities, luminal velocity will occur. Luminal velocities may also correspond to quasiparticles, or photons; subluminal velocities may correspond to mesoscopic physics, having atoms, molecules, among others. Understanding of superluminal velocity signals are important, since they can provide insight into modeling of the superluminal vacuum space systems; presently, author is working with international group of scientists, theoretical as well as experimental physicists about superluminal systems, further, to investigate nature of origin of the matter from vacuum quanta.

To get a head-start tackling complex situational paradox, more problem solving with quantitative computations of the zero-point, microblackhole source-sink mechanisms are analyzed below all in detail by fundamental calculations relating sizes of the entities possible with high gradient energy of the zero-point versus vacuum energy.

It is worthwhile calculating zero-point spring constant from the knowledge of the vacuum energy $E_o = h.\omega/2\pi = 10^{-20}$ J, and harmonic oscillator = kr^2 [26-28], to get:

$$E_o = h.\omega/2\pi = h(k/m)^{1/2}/2\ \pi = 10^{-20}\ J \tag{7}$$

Since typical monopole mass value varies from 10^{-47} kg to 10^{-11} kg [26-28], the zero-point spring constant will have to be evaluated from Equation (7), written as a function of monopole mass:

$$k \cong 10^{28} M_m \text{ metric units} \tag{7.1}$$

where $m = M_m$ is the monopole mass. Although zero-point energy and the vacuum energy has analogous relationship, huge difference among vacuum energy and dark energy has been brought about elsewhere [29-30].

Using above evaluation of the zero-point gradient energy Equations (5) and (5.1), E_g, in terms of energy field constants, k_α & k_ρ, magnitude of energy equation may be written as:

$$\hbar\omega = E_g \approx (k_\alpha^2/k_\rho) \tag{8}$$

Having k_α and k_ρ equal to $k_e \approx 8.988\times10^9\ N\cdot m^2\cdot C^{-2}$, as reasoned above, it is possible then to write:

$$E_o/E_g \cong k.r^2/(\ k_\alpha{}^2/\ k_\rho) = k.r^2/k_e. \tag{8.1}$$

Numerically, we know $E_o = 10^{-20}$ J, from vacuum energy (Equation (7)) and $E_g = 10^{26}$ metric units, value from zero-point vacuum energy [1], as discussed above. Therefore:

$$E_o/E_g \approx 10^{-20}/10^{26} = 10^{-46} \text{ (unit-free ratio!!)} \tag{8.2}$$

Equations (7), (7.1), (8), (8.1), and (8.2) will thus give:

$$k.r^2/k_e = 10^{28}.M_m.r^2/k_e \tag{8.3}$$

Overall equation evaluating Equation (8.3), using above value $E_o/E_g \cong k.r^2/k_e \approx 10^{-46}$, will be:

$$10^{28}M_m.r^2/k_e = 10^{-46}\ \text{i. e., } r \geq 10^{-32}/(M_m)^{1/2}\ \text{meter} \tag{8.5}$$

Hence if $M_m = 10^{-47}$ kg, then $r \approx 10^{-8}$m, calculating through Equation (8.5); this value then is comparable to the radius of a Bohr's atom [31-32]. If $M_m = 10^{-11}$ kg, $r \approx 10^{-26}$ m, calculating through Equation (8); this value then is orders of magnitude smaller than classical radius of an electron having value of 10^{-15} m, and the physical radius of an electron with a value only of 10^{-18} m [31-32]**.** Therefore, analytically with above computations, depending on monopole mass, radius calculation of entity with zero-point gradient energy of 10^{26} metric units may correspond to sizes of entities orders of value magnitude less than that of electron-positron sizes, which would suggest that quasi-particles having sizes, with value of 10^{-26} m or even less, generated especially by microblackhole compressing monopole mass to 10^{-11} kg; after propagation of these quasi-particles, radius sizes expand to higher values, having reduced monopole mass, closer to 10^{-47} kg [31-44].

General solutions of the Schrödinger Helmholtz Hamiltonian equations [1] are applied to problem-solving successfully of acceptable form of the gradient of energy = $k_\alpha/r\text{^}2 + k_\rho/r\text{^}3$ metrically, with k_α and k_ρ equivalent to the Coulomb's constant, k_e. The final solutions have showed entity sizes having magnitudes much less than that of typically Standard Model fermionic particles, such as electrons and positrons. The role of zero-point and microblackhole is to act like source-sink mechanism, with the zero-point creating energy gradient of 10^{26} metric units; this extremely high level of energy will be consistent with Grand Unified Theoretical conjecture of monopole presence [33-35]. Also, such extremely high levels of energy will be necessary to account for the computed high energy densities capable of supplying enough energy to create quarks, antiquarks, and gluons, per Quantum Field Theory Standard Model, associating Higgs-Boson to be typically God particle to facilitate genesis processes.

Figures 1 and 2 specifically reveal about the effect that the vortex fields have on the sinusoidal type of vacuum fluctuations [1, 11-13, 25]. Localization of the nonlinear high energy density signal output, shown by these figures, quite likely is a result of the reflection at the boundary of superluminal super-fluids with hydrodynamic like vortex fields that will have sufficient rotational energy to sustain Hamiltonian oscillators capable of generating pulses, fading with the damped oscillations evident in a nonlinear sinusoidal bunching in Figure 1. Interpreting Figure 2, as brought above, it is possible to identify regions of superluminal wave velocities, acting like super-fluids, exhibiting behavior of frictionless motion, with zero viscous flow characteristics [36-42]. One may expect this superfluidity aspect to then transform eventually to a damped oscillator laminar flow type situation with inertial conditions [43] to subluminal viscous or diffusional flow, characterized by the Fickian-like errorfunction-form signals that are characteristic of a space and time varying divergent flow.

Although it may be a little speculative here, it is worthwhile noting here that while vacuum quanta may be acting like super-fluids, the localized oscillators will be expected to operate like the inertial matter, that are reminiscent of the hydrodynamic systems or electrochemical system environments materials that have mesoscopic physics with diffusional nature, where materials science characteristics of point defect structure with vacancies – anionic, cationic, neutral, and line defect structure with dislocations play important role not only in the strength of materials, but also in the electronic, chemical, electrochemical, and corrosion properties within environmental materials physics [45-49].

Superluminal quanta are apparently evident from the work of Jeong et al [50-52], where they have obtained for the charge of the electron $1.6021766x10^{-19}$ coulomb, the measured magnetic monopole charge value of $1.463x10^{-35}$ Weber, and the speed of the magnetic monopole neutrino to be $1.095x10^{16}$ m/ sec, which is $3.652x10^{7}$ times the speed of light to be able to stabilize the hydrogen atom. It is quite possible to have phases changing from superluminal to luminal quantum wave particles to subluminal matter.

Extending beyond systems virtually exhibiting light monopoles, recently scientists like Maria de Lourdes Z. P. Deglmann et al [50-52] are researching possibility of existence of dark monopoles out of Yang-Mills-Higgs theory, having monopole mathematics providing feasibility of non-Cartan subalgebra solutions capable of predicting dark monopoles' existence with a non-Abelian magnetic charge [50-52].

3.1. Wavefunction collapse through the micro-worm-hole

It makes sense, from the foregoing formalisms that quantum manifolds may extend to global vacuum space quanta to relativistic macro astrophysics. The micro macro linkage possibly occurs through the microwormhole. Extending beyond microblackhole [1], one may speculate resulting micro-whitehole after-effect, in turn related to

microwormhole events. These are possible due to collapsing wavefunction that are indicated by the simulated signal output of equivalent wave velocity in vortex quagmire, appearing in Figure 2. Author is providing these extensions, perhaps speculative, presently to open possibilities to explore how those transmissions of such disturbances or perturbations create ever changing time-fields. These aspects will then be analyzed further in author's upcoming papers, addressing relativistic real-time and proper-time efflux situations.

4. CONCLUSIONS

Algebraic equations were derived from problem solving of previously developed model ansatz generalized Hamiltonian quantum mechanics of vacuum quanta formalism. Specifically, energy in the functional forms having attractive-repulsive terms were applied quantitatively. These equations having complex transcendental components would be requiring complex numerical computations that might be too time-consuming to provide the process physics. However, physical analysis of these equations gave insight on the workings of these equations, especially how the input fields vortex signals modulate sinusoidal waveforms output signals.

Schematics with graphical plots and sketches yielded useful results to get deeper understanding of how high energy get generated by vacuum quanta. With input vortex signals, output sinusoidal signals showed bunching effects, suggestive of conversion of energy to condensed form like time-crystal physics, with quasi, fermionic, or bosonic type of particles.

Equivalent motion entity aspects were obtained by considering motion of charge in combined fields. Applying quantum equivalence to $\mathcal{E} = v \times B$ by knowing gradient energy, Eg in terms of attractive-repulsive field constants, obtained by solution of the partial differential equations, profile of velocity was obtained from oscillatory signals. They showed that superluminal velocities are quite possible. The low signal profile, having subluminal or luminal velocities would represent particles of fermionic or bosonic nature, proposing possibility of the existence of a superfluid condensate acting in essence as vacuum quanta quagmire.

To gain an understanding of the sizes of these entities possibly generated out of the zero-point microblackhole operations, zero-point spring constants were calculated from the available well-known physics of zero-point energy, monopole mass, and harmonic oscillator relationships. Comparison of the derived energy gradient in terms of field constants with zero-point energy and spring constants gave estimation of sizes of these entities to be typically 10^{-26} m, that is many orders of magnitude less than the known sizes of fermions and Bohr atom, 10^{-18} m to 10^{-15} m.
Analytical interpretation of above computations showed that depending on monopole mass, entity sizes with zero-point gradient energy of 10^{26} metric units, sizes of these entities may vary from values of 10^{-26} m or even lesser to 10^{-18} m, especially due to microblackhole mechanism compressing monopole mass from 10^{-47} kg to 10^{-11} kg. With entities propagating away from microblackhole, monopole mass value reducing closer to 10^{-47} kg with evolution of time, continuous propagation of generators assisted by quantum field photon mediators will be expected to create quarks, antiquarks, as well as gluons out of vacuum quanta.

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