Journal of Modern Physics, 2023, 14, 1771-1782
https://www.scirp.org/journal/jmp
ISSN Online: 2153-120X
ISSN Print: 2153-1196

How to Achieve a Warp Drive

Juan A. Miranda-Colón

Independent Researcher, Puerto Rico, USA
Email: maruca397@yahoo.com

How to cite this paper: Miranda-Colón, J.A. (2023) How to Achieve a Warp Drive. *Journal of Modern Physics*, **14**, 1771-1782.
https://doi.org/10.4236/jmp.2023.1413106

Received: September 30, 2023
Accepted: December 24, 2023
Published: December 27, 2023

Abstract

In this paper, we delve into the intrinsic nature of mass and gravity, as per the amplitude modulation interpretation of the quantum theory. We explore the idea that the elementary constituent is an electromagnetic configuration that interacts with the quantum field, leading to the emergence of inertia and gravity as a reaction to the exchange with the quantum field. While these two phenomena have a common origin, they are distinct. Our proposal suggests manipulating the connection between the quantum field and the particle using high-frequency electromagnetic fields, thereby making a warp drive possible.

Keywords

Photon, Inertia, Gravity, Maxwell's Equations, Magnetic Monopoles, Fine Structure Constant, Warp Drive, *Zitterbewegung*

1. Introduction

As we delve deeper into our analysis, previously discussed in a paper regarding the amplitude modulation hypothesis of the quantum theory, we mention the possibility of manipulating inertia and gravity [1] [2]. Controlling a characteristic or property of a physical object at volition often requires specific knowledge about what we desire to modify. We develop a "toy" model incorporating crucial details from the amplitude modulation interpretation to elucidate the nature of gravity and inertia and propose a method to surmount them. The description or meaning of the fine structure constant and a definition of magnetic monopoles are the foundation on which we build this conjecture. Indeed, inertia is subtly in the fundamental equations concerning classical electrodynamics, and we argue that gravity and inertia are electromagnetic phenomena. In the proposed view of the quantum theory, the elementary constituent is a consequence of an amplitude modulation phenomenon. Hence, associating a second wave to the elementary particle analogous to the signal wave in communications the author refers to as Castellano's wave. In essence, Castellano's wave modulates the amplitude of the de Broglie wave. We, therefore, posit that the second wave is the hidden variable, whose absentia has caused a plethora of interpretations to explain the counterintuitive quantum behaviors or observations. The foundations of quantum physics are a contentious subject where some interpretations are as bizarre as the events they are supposed to explain. Indeed, Schrödinger exemplified the absurdity of the most acknowledged rendition with his cat thought experiment. In the amplitude modulation interpretation, the cat oscillates between dead and alive. Namely, the system oscillates between its possible states. A comparable physical prediction would be the oscillation of the photon's polarization, which explains the observations in the entanglement experiments. The Quantum entanglement phenomenon is a form of synchronicity; no strange or spooky connections link quantum particles. In the following, we will use the mathematical framework of geometric algebra, because it is more natural, less arduous, and straightforward when dealing with these concepts. Moreover, we shall not address controversies or historical debates related to the previous assertions. However, instead, we focus on information regarding how to achieve a warp drive.

2. Fine-Structure Constant

As per our understanding of Schrödinger's *Zitterbewegung* equation [3], the elementary constituent is an amplitude-modulated wave. The amplitude modulation thesis is essential to this paper because it proposes a linear momentum, velocity, force, energy, and mass, among others, for each wave involved in the modulation. The quantum entity is a dynamical system that oscillates among its various possible states and has an information capacity of one bit. Furthermore, the particle is an emergent phenomenon whose radius is the relativistic reduced Compton wavelength. The boundary shares similarities with a quantum oscillator; the particle is in breathing mode. To be precise, its surface vibrates at the broadband frequency, two times the frequency of the signal, carrier, and mass. Given its persistence in fundamental factors, the Compton frequency is the system's natural frequency and remains crucial in our analysis. The Dirac theory presents an intriguing aspect involving certain equations viewed as curiosities without clear physical significance or relevance [4]. These equations have been mainly disregarded due to a lack of understanding of their physical meaning. However, two specific equations warrant closer examination. In particular, one equation we deem fundamental in comprehending the manipulation of inertia and the Sommerfeld constant. The equation in question is as follows, where the Dirac Hamiltonian H_c represents the dynamics of the carrier wave. In the Heisenberg picture, regarding the Dirac Hamiltonian with electromagnetic interactions, there is a dependence on time;

$$\frac{\mathrm{d}H_c}{\mathrm{d}t} = -qc\boldsymbol{\alpha}' \cdot \boldsymbol{E} = -q\boldsymbol{u} \cdot \boldsymbol{E} \tag{1}$$

According to the interpretation we bestow on the power equation, the quantum entity emits and absorbs energy, even though it is supposed to be a constant of motion. This behavior suggests an interaction between the quantum entity and its surroundings, as it communicates with the quantum vacuum field by engaging with it. The vacuum field and the elementary constituent constitute a self-contained system and can be treated as a closed system for quantum mechanical analysis. Namely, the particle is not within or surrounded by the field but an integral part of it. To formulate the toy model, we propose the following Hamiltonian, which takes a purely mechanical perspective on the system. The amplitude represents the zero-point energy of the quantum system, while the unitary operator describes a self-contained quantum system's time evolution or propagation. A critical characteristic of this operator is that it is a unitary transformation, meaning that it is reversible. This property has important implications in the study of quantum mechanics, as it allows for the conservation of information. We conclude that the sign of the exponent of the oscillation is positive, owing to a discernible relationship between the reduced Compton wavelength and the Hamiltonian from the *Zitterbewegung* term in Schrödinger's equation. The multiplication of operators results in a constant, which further supports our determination of the positive sign ($H\lambda_r = c\hbar$). Additionally, regarding the imaginary unit, it ensures the correct sign in the calculations and shifts the oscillation phase. It enables us to describe an oscillation that is real accurately.

$$H = \frac{1}{2}\omega\hbar i e^{2\omega i t} \tag{2}$$

This equation is equivalent to the Dirac Hamiltonian with electromagnetic interactions, considering the quantum entity's fields, potentials, and rest mass, where the parameter β represents the fourth Dirac matrix.

$$H_c = \boldsymbol{u}\cdot\boldsymbol{\zeta} - qV + m_0 c^2 \beta \tag{3}$$

With the Hamiltonian (2) and simplifying Equation (1), we determined the oscillating electric field, which encompasses the particle resulting from its interaction with the quantum field, where the Schwinger limit is a particular case.

$$E = \frac{\omega^2\hbar}{qu} e^{2\omega i t} \tag{4}$$

By applying basic principles of electrostatics, one can also ascertain the electric field on the surface of the quantum object, where the following expression is tantamount to the previous amplitude.

$$E = \frac{q}{4\pi\epsilon_0 \lambda_r^2} \tag{5}$$

Moreover, when we compare the magnitude of the two, we come to the subsequent correlation.

$$\frac{c}{u} = \frac{q^2}{4\pi\epsilon_0 c\hbar} \tag{6}$$

Assuming that the charge in the previous equation is that of the electron, and the relation regarding the phase velocity and group velocity, $uv = c^2$, we can arrive at the fine-structure constant. This constant is a product of the relativistic analysis of the hydrogen atom's spectral lines. Sommerfeld discovered that the constant is the ratio of the electron's tangential speed in the first circular orbit of the relativistic Bohr atom to the speed of light in the vacuum. It is important to note that the electron in the first circular orbit is in resonance and is a standing wave. However, the result obtained is for a free particle. Therefore, the speed is the magnitude of the minimum translational velocity for the free electron. By analysis of the equation, we infer that the constant is unique to the electron and relates to its intrinsic parameters, including the ratio of external to internal fundamental physical parameters.

$$\frac{c}{u} = \frac{v}{c} = \frac{e^2}{\varrho^2} = \frac{\varepsilon}{\varepsilon_0} = \alpha \tag{7}$$

Hence, there is a Planck charge in the interior of all the elementary constituents, including the photon.

3. Photon Charge

Despite the widespread belief that photons do not have an inherent electric charge, surprisingly, a fact that is not widely known, researchers can still nondestructively detect them in resonant cavities because they display an electric charge when confined or trapped. There are other phenomena, such as Delbrück scattering and photon deflection by magnetic fields in certain mediums or photon molecules, where the photon mimics the behavior of particles possessing an electric charge [5]-[10]. It is worth mentioning that each of these phenomena has a corresponding theory, which reminds the author of the infamous epicycles. According to physicist Dr. V. Brown, he adduced the emergence of a charge in trapped photons for years and heard of its confirmation. However, when he inquired with researchers about their observations, they suggested he should forget it, as it is considered or perceived as a perilous concept (personal communication, April 13, 2002). Some inconvenient observations contrary to our current paradigms are censored, thus hindering progress. Understanding that photons acquire an electric charge in specific circumstances simplifies the explanation of numerous observations using a unified theoretical framework. To effectively understand the behavior of photons in cavities, we use the canonical momentum and the Liénard-Wiechert potential of the carrier wave in the modeling process.

$$\boldsymbol{\zeta} \equiv \boldsymbol{p} - q\boldsymbol{A} \tag{8}$$

For a photon displacing across the vacuum, the momentum is $\boldsymbol{p}$. However, when it is in a high-Q cavity;

$$\boldsymbol{\zeta} = -q\boldsymbol{A} = -q\frac{V}{c^2}\boldsymbol{u} \tag{9}$$

Since for the photon,

$$H = \boldsymbol{u} \cdot \boldsymbol{p} \tag{10}$$

From which the energy-momentum relation follows and will be helpful in the following sections.

$$\mathcal{E}^2 = c^2 p^2 \tag{11}$$

Therefore,

$$H = -q\boldsymbol{A} \cdot \boldsymbol{u}$$

$$\hbar\omega = -qV$$

With the voltage on the surface of the photon in the high-Q cavity;

$$\hbar \frac{c}{\lambda_r} = -q\left(-\frac{q}{4\pi\varepsilon_0\lambda_r}\right)$$

Thus,

$$q = \pm\sqrt{4\pi\varepsilon_0 c\hbar} \tag{12}$$

The charge that enables researchers continuously observe and count nondestructively photons in high-Q cavities is the Planck charge ϱ [11].

4. Photon Rest Energy

The photon's energy and that of the other elementary constituents regarding the amplitude modulation interpretation is twice the observed amount. Each wave in the modulation process contributes the same energy to the system, half observed in each cycle of the photon's *Zitterbewegung*. The following is the energy of the electromagnetic field, and we associate it with the carrier wave:

$$\mathcal{E} = \frac{1}{2}\int\left(\varepsilon_0 E^2 + \frac{1}{\mu_0}B^2\right)\mathrm{d}\tau \tag{13}$$

The mathematical formulas pertaining to the energy stored in electric charge and current distributions follow.

$$\mathcal{E}_{elec} = \frac{1}{2}\int(V\rho)\mathrm{d}\tau = \frac{\varepsilon_0}{2}\int E^2\mathrm{d}\tau + \frac{\varepsilon_0}{2}\int(V\boldsymbol{E})\cdot\mathrm{d}\boldsymbol{a} \tag{14}$$

$$\mathcal{E}_{mag} = \frac{1}{2}\int(\boldsymbol{A}\cdot\boldsymbol{J})\mathrm{d}\tau = \frac{1}{2\mu_0}\int B^2\mathrm{d}\tau - \frac{1}{2\mu_0}\int(\boldsymbol{A}\times\boldsymbol{B})\cdot\mathrm{d}\boldsymbol{a} \tag{15}$$

Equation (13) and an additional term result from the summation of the previous expressions. Indeed, according to the literature [12], the integration over all space implies that the surface integrals are supposed to tend towards zero, leaving behind only the volume integrals. However, there is no rigorous formal proof regarding the previous assertion. Arguments intend to discard the surface integral terms to obtain the well-known conclusion that the energy in circuits is in the fields. Regardless, the surface integrals are zero for the photon, yet not because of the aforementioned arguments.

$$\frac{1}{2}\int\left(\varepsilon_0 V\boldsymbol{E} - \frac{1}{\mu_0}\boldsymbol{A}\times\boldsymbol{B}\right)\cdot\mathrm{d}\boldsymbol{a} = 0 \tag{16}$$

We will demonstrate that the previous discarded terms correlate directly to the free photon's rest energy, which regarding the formula, is ultimately equal to zero—Scilicet, the inertial mass, is subtly found in discarded terms from fundamental electrodynamics.

5. Photon Internal Forces

The stability of the elementary constituent depends on two opposing entropic forces, with equal magnitude and out of sync with each other. However, in the case of the photon, they are not out of phase and cancel each other; there is perfect equilibrium. Moreover, these forces are in plain sight in the fundamental equations relating to the photon's electric and magnetic components.

$$\boldsymbol{E} = -\boldsymbol{u} \times \boldsymbol{B},\ \boldsymbol{u} \cdot \boldsymbol{E} = 0,\ \boldsymbol{B} = \frac{1}{c^2} \boldsymbol{u} \times \boldsymbol{E},\ \boldsymbol{u} \cdot \boldsymbol{B} = 0,\ \|\boldsymbol{u}\| = c \tag{17}$$

It is acknowledged that the expressions denote the known conventional fact that the velocity and the field for the photon are mutually orthogonal. However, there is a more profound meaning to the previous relations since, along with Formula (1), the following puzzling attractive Lorentz-type force also surges from the Heisenberg picture.

$$\boldsymbol{F}_c = -q\left(\boldsymbol{E} + \boldsymbol{u} \times \boldsymbol{B}\right) \tag{18}$$

Therefore,

$$\frac{\mathrm{d}H_c}{\mathrm{d}t} = \boldsymbol{u} \cdot \boldsymbol{F}_c \tag{19}$$

Furthermore,

$$F_c = -\frac{\omega^2 \hbar}{u} \mathrm{e}^{2\omega i t}$$

where,

$$m = \frac{1}{2} \frac{\omega \hbar}{c^2} i \mathrm{e}^{2\omega i t},\ a_c = 2\omega v i \tag{20}$$

We resolve that this force is one of the two entropic forces holding together the elementary constituent. Indeed, it is zero for the photon, and since (1) is also zero for the photon, we end up with the first and second terms in (17). The third relation results from equating to zero the following repulsive magnetic Lorentz-type force.

$$\boldsymbol{F}_s = q_m \left(\boldsymbol{B} - \frac{1}{c^2} \boldsymbol{v} \times \boldsymbol{E}\right) \tag{21}$$

Thus, the second entropic force also follows from the Heisenberg picture, however, with a Hamiltonian and momentum, which describes the behavior of the signal wave. Additionally, the matrix χ is associated with the time component of the group velocity, while the rest mass pertains to the magnetic field.

$$H_s = \boldsymbol{v} \cdot \boldsymbol{\zeta}' + q_m V_s + m_0' c^2 \chi \tag{22}$$

We define the electric vector potential A_s regarding the magnetic scalar potential V_s.

$$\zeta' \equiv m_0'\boldsymbol{u} + q_m \frac{V_s}{c^2}\boldsymbol{v} = \boldsymbol{p}' + q_m \boldsymbol{A}_s.$$

where,

$$\boldsymbol{B} = \nabla V_s + \frac{\partial \boldsymbol{A}_s}{\partial t},\ \ \boldsymbol{E} = -\nabla \times \boldsymbol{A}_s$$

Furthermore, in geometric algebra, the magnetic charge and the magnetic scalar potential are trivectors.

$$q_m \equiv cq\mathrm{í},\ \ V_s \equiv \frac{V}{c}\mathrm{í}$$

There is also time dependence upon analyzing the Hamiltonian of the signal in the Heisenberg picture; the fourth term in Equation (17) directly results from this time dependence.

$$\frac{\mathrm{d}H_s}{\mathrm{d}t} = q_m \boldsymbol{v} \cdot \boldsymbol{B} = \boldsymbol{v} \cdot \boldsymbol{F}_s \tag{23}$$

Therefore, it is crucial to acknowledge the existence of a magnetic charge in addition to the electric charge.

6. Magnetic Monopoles

Succinctly, regarding magnetic charges, they are essentially oscillating electric charges that generate a homogeneous field with zero polarity. The Planck charge oscillates in the interior of the elementary constituent in a loop with a Planck radius. The oscillation is akin to a current loop, therefore for two current loops, and according to magnetostatics, the force that each loop feels is:

$$\boldsymbol{F} = -\frac{\mu_0}{4\pi} I_1 I_2 \oint\oint \frac{\hat{\boldsymbol{r}}}{r^2} \mathrm{d}\boldsymbol{l}_1 \cdot \mathrm{d}\boldsymbol{l}_2$$

The electric current loops are equivalent;

$$R_1 = R_2 = R$$

And assuming the simples configuration between the loops,

$$\boldsymbol{F} = -\frac{\mu_0}{4\pi} I_1 I_2 \oint\oint \frac{\hat{\boldsymbol{r}}}{r^2} \mathrm{d}l_1 \mathrm{d}l_2$$

Therefore, let $I = \frac{q}{T} = qf$, and $\mathrm{d}l = R\mathrm{d}\theta$;

$$\boldsymbol{F} = -\frac{\mu_0 q^2 f_1 f_2 R^2}{4\pi r^2}\left(\oint \mathrm{d}\theta\right)^2 \hat{\boldsymbol{r}}$$

$$\boldsymbol{F} = -\frac{\pi\mu_0 q^2 f_1 f_2 R^2}{r^2}\hat{\boldsymbol{r}}$$

Since the system's frequency is the Compton frequency; therefore, according to the Einstein-de Broglie relation, $fh = mc^2$.

$$\boldsymbol{F} = -\frac{\pi\mu_0 q^2 c^4 m_1 m_2 R^2}{h^2}\frac{\hat{\boldsymbol{r}}}{r^2}$$

Hence, because the radius R is the plank length and q is the Planck charge, gravity is a magnetic force due to magnetic monopoles.

$$\boldsymbol{F} = -G\frac{m_1 m_2}{r^2}\hat{\boldsymbol{r}}$$

The interaction of the Planck charge that resides in the particle's interior with the surrounding environment is the source of gravity and inertia, which is the gist of the conjecture. Modifying gravity's effects on objects, whether to weaken or intensify them, necessitates the implementation of magnetic fields. Therefore, by applying the same methodology that led to Equation (4) development, we arrive at a new equation that contains pertinent information regarding the magnetic field necessary to achieve this objective. This equation also incorporates the Schwinger magnetic field limit as a unique condition in its amplitude.

$$B = \frac{\omega^2\hbar}{q_m v}\mathrm{e}^{2\omega i t} \tag{24}$$

where the magnetic Lorentz force is:

$$F_s = \frac{\omega^2\hbar}{v}\mathrm{e}^{2\omega i t} \tag{25}$$

And,

$$m' = \frac{1}{2}\frac{\omega\hbar}{c^2}i\mathrm{e}^{2\omega i t},\quad a_s = -2\omega u i \tag{26}$$

Regarding the acceleration, if we require the mass associated with the force to be positive, the acceleration must be negative. In the previous article, multiplying the amplitude of the waves involved in the modulation process yielded the square of the particle radius. Similarly, the product of the acceleration of the waves must result in the square of the *Zitterbewegung* acceleration. Therefore, we add the imaginary units to the acceleration to obtain the correct result. However, this introduces the imaginary unit in the oscillating mass equation to balance the equation, resulting in an eigenvalue of Equation (2). In the following, we will establish expressions for the inertial mass in representations of electric and magnetic fields.

7. Inertial Mass

We will obtain Maxwell's equations in the vacuum, and the approach involves Geometric algebra and applying the energy and momentum operators of the quantum theory to the photon's field component equations. Consequently, we obtain expressions for inertial mass regarding electromagnetic fields and potentials as a byproduct. The initial point of departure will be the components derived from the Lorentz magnetic force, enabling us to acquire Gauss and Faraday's law.

$$\boldsymbol{B} = \frac{\boldsymbol{u}}{c^2}\times\boldsymbol{E}$$

With the geometric product,

$$\boldsymbol{up} = \boldsymbol{u} \cdot \boldsymbol{p} + \acute{\imath}\boldsymbol{u} \times \boldsymbol{p}$$

Since for the photon $\boldsymbol{u} = \boldsymbol{v}$,

$$\boldsymbol{up} = \boldsymbol{u} \cdot \boldsymbol{p} = H$$

$$\boldsymbol{u} = H \frac{\boldsymbol{p}}{|\boldsymbol{p}|^2}$$

$$H \to i\hbar \frac{\partial}{\partial t}, \quad \boldsymbol{p} \to -i\hbar\nabla$$

1) Faraday's Law

$$\boldsymbol{B} = \frac{H\boldsymbol{p}}{c^2 |\boldsymbol{p}|^2} \times \boldsymbol{E}$$

$$H\boldsymbol{B} = \boldsymbol{p} \times \boldsymbol{E}$$

$$i\hbar \frac{\partial}{\partial t} \boldsymbol{B} = -i\hbar\nabla \times \boldsymbol{E}$$

$$\therefore \frac{\partial \boldsymbol{B}}{\partial t} = -\nabla \times \boldsymbol{E}$$

2) Gauss's Law for Magnetism

$$\boldsymbol{p} \cdot \boldsymbol{B} = \boldsymbol{p} \cdot \left(\frac{\boldsymbol{u}}{c^2} \times \boldsymbol{E} \right)$$

$$-i\hbar\nabla \cdot \boldsymbol{B} = -i\hbar\nabla \cdot \left(\frac{\boldsymbol{u}}{c^2} \times \boldsymbol{E} \right)$$

$$\nabla \cdot \boldsymbol{B} = 0$$

Careful adherence to the outline procedure mentioned above, with the electric force field components, allows us to obtain the remaining relations: Ampere's and Gauss's law. We can take things further by incorporating the Hamiltonian of the signal (22) and carrier (3). Consequently, this approach has allowed us to derive Maxwell's equations again and the subsequent unique set of promising relations.

$$-qV\boldsymbol{E}\beta - mc^2\boldsymbol{E} + qc^2\boldsymbol{A} \times \boldsymbol{B} = 0 \tag{27}$$

$$-m_0'c^2\boldsymbol{B}\chi - q_m\boldsymbol{A}_s \times \boldsymbol{E} + q_m V_s \boldsymbol{B} = 0 \tag{28}$$

With Gauss's law and assuming that the matrices β and χ are the identity matrix in the previous relations, the rest energy and rest mass for the photon articulated in terms of electromagnetic fields and potentials are the following. We conjecture that this concept overarches all the elementary constituents.

$$m_0 c^2 = \int \left[\varepsilon_0 V\boldsymbol{E} - \frac{1}{\mu_0} \boldsymbol{A} \times \boldsymbol{B} \right] \cdot \mathrm{d}\boldsymbol{a} \tag{29}$$

$$m_0' c^2 = -\frac{1}{\mu_0} \int \left[V_s \boldsymbol{B} + \boldsymbol{A}_s \times \boldsymbol{E} \right] \cdot \mathrm{d}\boldsymbol{a} \tag{30}$$

Equation (16) is a specific instance of Equation (29), indicating that a free photon has no rest mass. However, the derivation process suggests that if the photon obtains a charge, it might also acquire mass. Since the electric mass is nil, we conclude that the magnetic inertial mass (30) is also zero and consequently.

$$\int\left[\frac{V\boldsymbol{B}}{\mu_0 c}+\varepsilon_0 c\left(\boldsymbol{A}\times\boldsymbol{E}\right)\right]\cdot\mathrm{d}\boldsymbol{a}=0 \tag{31}$$

Nonetheless, by utilizing the principles of vector identities, we arrive at the equation for the aggregate energy of the magnetic charge and current distributions, the magnetic analog of Equations (14) and (15).

$$\mathcal{E}_{mag}=\frac{1}{2c}\int V\rho_{mag}\,\mathrm{d}\tau \tag{32}$$

$$\mathcal{E}_{elec}=-\frac{c}{2}\int \boldsymbol{A}\cdot\boldsymbol{J}_{mag}\,\mathrm{d}\tau \tag{33}$$

Hence, the magnetic monopole is undergoing an oscillatory motion, which may result in the emergence of an electric charge. This eventuality would then serve as the origin of the particle's intrinsic charge.

8. Conclusion

The realm of science fiction often alludes to hypothetical technological devices that enable vehicles to circumvent the limitations or restrictions on motion imposed by inertia. With these devices, vehicles accelerate and displace at high speeds or even surpass the speed of causality. Among these apparatuses, the most prominent is the warp drive. Researchers have proposed several warp-type mechanisms based on our current comprehension of gravity, as there are no explicit hypotheses about its nature. Nonetheless, this paper presents an intriguing assumption regarding the fundamental nature of gravity and inertia. Indeed, the research suggests that these two phenomena are intricately linked to electromagnetic forces and can be influenced by applying highly intense high-frequency electromagnetic fields according to Equations (4) and (24). Although this concept may seem reminiscent of previous theories, this paper's approach is unique. The concepts and ideas presented by the author are open to falsification and not limited to gravity and inertia but also include the fine structure constant, magnetic monopoles, the Photon, and entropic forces that play an essential role in holding the particle together. As a result, this paper takes the field of physics closer to a plausible ontology. In a forthcoming paper, we shall further delve deeper into these concepts and explore the potential for a theory of almost everything where the vacuum field interacts with itself, generating an electromagnetic configuration whose properties and characteristics are emergent. Namely, the particle and the field are the same thing in different states. As per our presentation, we did not provide the blueprints for a warp drive-type mechanism; however, we propose that the technological feat of generating potent electric and magnetic fields around an object with the *Zitterbewegung* frequency will disrupt or distort the connection with the ubiquitous quantum field. This will render the entity impervious to the vacuum field, permitting or opening up previously impossible avenues for displacement, acceleration, and even cloaking, making it feasible to achieve a warp drive.

Acknowledgements

The author expresses utmost gratitude regarding Professor Dr. Castellanos's mentorship and assistance. His sagacious counsel and invaluable guidance have been instrumental in fostering the author's professional growth and development.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

[1] Miranda-Colón, J. (2022) *Journal of Modern Physics*, **13**, 301-314. https://doi.org/10.4236/jmp.2022.133021

[2] Miranda-Colón, J. (1994) About the Nature of the Wave Function and the New Developments in Quantum Mechanics. Master's Thesis, University of Puerto Rico, Mayagüez, PR.

[3] Schrödinger, E. (1930) Über die Kräftefreie Bewegung in der Relativistischen Quantenmechanik. Sitzungsberichte Akad, Berlin, 418.

[4] Sakurai, J.J. (1967) Advanced Quantum Mechanics. Addison-Wesley, Boston.

[5] Haywood, R. (2023) *Journal of Modern and Applied Physics*, **6**, No. 1.

[6] Zhou, D.L., Zhou, L., Wang, R.Q., Yi, S. and Sun, C.P. (2007) *Physical Review A*, **76**, Article ID: 055801. https://doi.org/10.1103/PhysRevA.76.055801

[7] Brzobohatý, O., Karásek, V., Šiler, M., *et al.* (2013) *Nature Photon*, **7**, 123-127. https://doi.org/10.1038/nphoton.2012.332

[8] Burke, D.L., Field, R.C., Horton-Smith, G., Spencer, J.E., Walz, D., Berridge, S.C., Bugg, W.M., Shmakov, K., Weidemann, A.W., Bula, C., McDonald, K.T., Prebys, E.J., Bamber, C., Boege, S.J., Koffas, T., Kotseroglou, T., Melissinos, A.C., Meyerhofer, D.D., Reis, D.A. and Ragg, W. (1997) *Physical Review Letters*, **79**, 1626-1629. https://doi.org/10.1103/PhysRevLett.79.1626

[9] Mann, C., Horsley, S.A.R. and Mariani, E. (2020) *Nature Photonics*, **14**, 669-674. https://doi.org/10.1038/s41566-020-0688-8

[10] Shen, J.-T. and Fan, S.H. (2007) *Physical Review Letters*, **98**, Article ID: 153003. https://doi.org/10.1103/PhysRevLett.98.153003

[11] Haroche, S. (1995) *Annals of the New York Academy of Sciences*, **755**, 73-86. https://doi.org/10.1111/j.1749-6632.1995.tb38957.x

[12] Griffiths, D.J. (1981) Introduction to Electrodynamics. Prentice-Hall, New Jersey.

Nomenclature

u phase velocity, v group velocity, $c\alpha'$ Dirac velocity, p group velocity momentum, p' phase velocity momentum, q electric charge, q_m magnetic charge, ϱ Planck charge, H Hamiltonian, H_s signal Hamiltonian, H_c carrier Hamiltonian, t time, R radius, r position, $\hat{r}$ radial unit vector, c speed of light, ω angular frequency, f frequency, T period, $\hbar$ reduce Planck constant, h Planck constant, λ_r reduce Compton wavelength, ϵ_0 permittivity in free space, μ_0 magnetic susceptibility in free space, ε permittivity in the interior of the electron, θ or ϕ angle, a the fine structure constant, V electric scalar potential, V_s magnetic scalar potential, í geometric factor, i imaginary number, A magnetic vector potential, A_s electric vector potential, $\mathcal{E}$ energy, τ volume, a area, j current, l loop length, ρ_m magnetic charge density, ρ electric charge density, G gravitational constant, E electric field, B magnetic field, ζ group velocity canonical momentum, ζ' phase velocity canonical momentum, F force, F_c electric force, F_s magnetic force, a_c carrier acceleration, a_s signal acceleration, m carrier mass, m' signal mass, m_0 and m_0' rest mass.