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A Novel Model for Elementary Particles: Light Charges and Their Motion in 5D Space-Time

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Abstract

This paper proposes a novel model for elementary particles, introducing the concept of "light charges", as fundamental entities that exhibit intriguing behavior in 5-dimensional space-time. Light charges are postulated to possess two velocity vectors: one moving at variable velocity, and one moving at the speed of light, that remain fixed relative to each other at perpendicular angles. These light charges interact with each other based on their charges, leading to changes in their motion over time. This paper derives equations based on the proposed model to investigate the behavior of light charges in various scenarios. Remarkably, the model is capable of reproducing known properties of elementary particles, including values for their charge, mass, and spin. This paper further discusses the implications of this model for our understanding of fundamental particles, including the potential connections to quantum mechanics and relativity. The proposed light charge model offers a new perspective on the behavior of elementary particles. While further research and validation are needed, this model may pave the way for a deeper understanding of the fundamental nature of matter and energy in the universe.

Keywords

Quantum Gravity, Black Holes

1. Introduction

Understanding the structure and nature of elementary particles has been a fundamental challenge in high-energy physics. Established theories, such as the Standard Model, have successfully described the behavior of particles at the subatomic level, but questions about the fundamental nature of particles and their interactions remain unanswered. This paper proposes a hypothesis based on "light charges" in higher-dimensional space as a potential model to explain the properties and behavior of elementary particles.

The hypothesis of light charges posits that particles, such as photons and electrons, can be understood as the behavior of charged point-like objects in higher-dimensional space. These objects, referred to as light charges, are hypothesized to orbit around each other and interact through electromagnetic forces, generating the observed properties of particles in our 3-dimensional universe. This novel perspective challenges the conventional understanding of particles as point-like objects or wave-like entities, and opens up new possibilities for explaining the fundamental nature of particles.

This paper presents a theoretical framework for the light charge hypothesis, including a detailed mathematical formulation of the model. The paper analyzes the behavior of light charges in higher-dimensional space, including their orbits, interactions, and properties. Next, the model is applied to explain the structure and properties of photons and electrons, including the derivation of photon and electron properties from the behavior of light charges.

Furthermore, the implications of the light charge model for phenomena such as the minimum frequency for pair production and the derivation of the equation for gravity are investigated. Next, speculative analysis explores the potential implications of the light charge hypothesis for black holes, dark matter, and quantum fluctuations.

It is important to note that the light charge hypothesis is speculative and requires further research, experimentation, and validation from established scientific theories. However, this hypothesis presents a novel and intriguing approach to understanding the structure and nature of elementary particles, and has the potential to shed light on fundamental questions in high-energy physics. The following sections present the theoretical framework, analyses, and speculative analyses to support the light charge hypothesis, and highlight the potential significance of this hypothesis for our understanding of the universe.

2. Theoretical Framework of Light Charge Hypothesis

The light charge hypothesis proposes a novel perspective on the structure and nature of elementary particles based on charged point-like objects in higher-dimensional space. In this section, the paper presents the theoretical framework of the light charge hypothesis, including the mathematical formulation and key concepts of the model.

2.1. Description of Light Charges

The light charge hypothesis postulates the existence of charged point-like objects, referred to as "light charges", which exist in higher-dimensional space beyond our 3-dimensional universe. These light charges, in **Figure 1**, are hypothetical entities that are distinct from conventional particles, such as protons, neutrons, and electrons, and are proposed as the building blocks of elementary particles.

Light charges are assumed to have certain properties that distinguish them

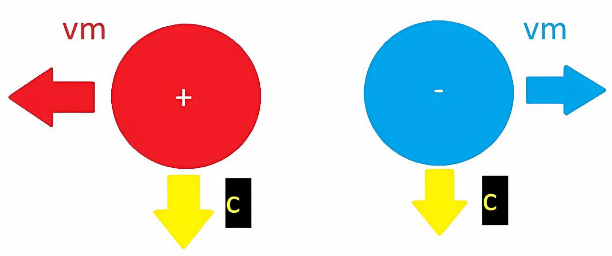

Figure 1. The internal structure of the two varieties of light charges.

from ordinary particles. They are hypothesized to be point-like, meaning they have no internal structure or substructure, and they are considered to be charged, carrying an electric charge, of sqrt(e0 * h * c), which is close to the planck charge, that can be positive or negative. It is proposed that these charges have no mass, have two velocity vectors, one of variable magnitude and the other of magnitude of the speed of light, and can interact with each other and with other entities in higher-dimensional space. The specific properties of light charges, such as their orbits, velocities, and interactions, are proposed to give rise to the observed properties of elementary particles in our 3-dimensional universe, such as their mass, charge, spin, and behavior in electromagnetic fields.

The concept of light charges is a speculative hypothesis that offers a new perspective on the fundamental nature of particles and their underlying structure. It is important to note that further theoretical and experimental investigations are required to test its validity and applicability in explaining the behavior of elementary particles.

2.2. Derivation of Photon and Electron Properties from Light Charges

The light charge hypothesis proposes that photons and electrons, as elementary particles, can be described in terms of the underlying structure and dynamics of light charges. According to the hypothesis, photons and electrons are composed of light charges that are bound together in specific configurations, giving rise to their observed properties and behavior.

Photon Properties from Light Charges:

The photon, as a fundamental particle of electromagnetic radiation, is postulated to be a configuration of light charges. The specific arrangement, as in Figure 2, and dynamics of light charges in a photon are proposed to determine its properties, such as its energy, momentum, and speed. The hypothesis suggests that the electromagnetic interactions of light charges, including their electric charges, orbits or trajectories in higher-dimensional space, play a crucial role in defining the properties of photons.

The energy and momentum of a photon are hypothesized to arise from the collective behavior of light charges in the photon configuration. The proposed dynamics of light charges, including their motion and interactions, can result in the energy and momentum carried by photons.

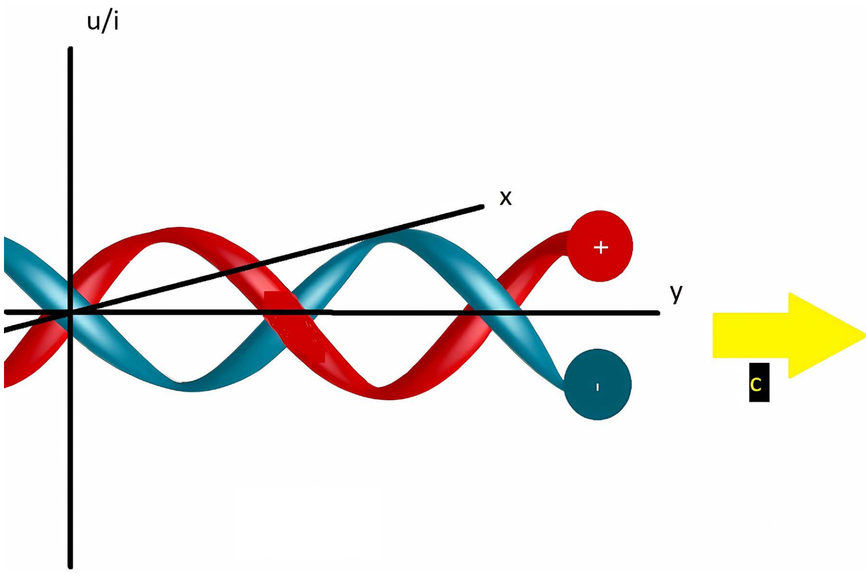

Figure 2. A single photon, constructed of two light charges, moving in a helix along the y axis.

For the photon, it is made of one positive light charge and one negative light charge orbiting themselves in an evolving helix that propagates at the speed of light. The charges stay at a distance of 2 * planck length from each other. In other words, if you look at them from the 4th spatial dimension axis, commonly considered to be the imaginary axis, i, and the x axis, they rotate in an unit circle where the radius is that of the planck length. The variable velocity vector is responsible for the frequency. This depiction gives a simple explanation as to why photons with higher frequencies have more energy. Photons with a high frequency have more energy because the variable velocity magnitude is greater.

From this model, one can understand the origins of $c = f*$ lambda. Since this is a system of point charges, one can determine the energy of the structure from the magnetic component of the Lorentz force multiplied by the distance, lambda, traveled over one cycle. The electric component of the Lorentz force cancels out over one cycle. One can use the magnetic force equation for a point charge, and then the magnetic field from the movement of the other point charge. It's worth noting that the energy of a photon is also known to be encapsulated by the equation, $E = h * f$. Taking the energy of one point charge, which will be half of that of the system, one can formulate the following equations.

$$F = q \cdot (v \times B)$$

$$B = \frac{\mu_0 \cdot q \cdot (v \times r)}{4 \cdot \pi \cdot r^2}$$

$$\text{Work} = \text{Force} \cdot \text{Distance}$$

$$q1 = q2 = q$$

$$q^2 = \varepsilon_0 \cdot h \cdot c$$

$$2 \cdot \pi \cdot r \cdot f = v$$

$$v1 = v2 = v$$

$$\varepsilon_0 * \mu_0 = \frac{1}{c^2}$$

$$w = 2 \cdot \pi \cdot f$$

$$\frac{1}{2} \cdot h \cdot f = q \cdot (v \times B) \cdot \lambda$$

$$\frac{1}{2} \cdot h \cdot f = q1 \cdot q2 \cdot v1 \cdot v2 \cdot \mu_0 \cdot \frac{1}{4} \cdot \frac{1}{\pi} \cdot \sin 90^\circ \cdot \sin 90^\circ \cdot \frac{1}{r^2} \cdot \lambda$$

$$\frac{1}{2} \cdot h \cdot v \cdot \frac{1}{2 \cdot \pi \cdot r} = q^2 \cdot v^2 \cdot \mu_0 \cdot \frac{1}{4} \cdot \frac{1}{\pi} \cdot \frac{1}{r^2} \cdot \lambda$$

$$h = h \cdot \varepsilon_0 \cdot c \cdot v \cdot \mu_0 \cdot \left(\frac{1}{r}\right) \cdot \lambda$$

$$c = w \cdot \lambda$$

The equations cancel out to give the identity of $c = w$ * lambda. At first, this conclusion seems wrong. It is actually correct. What is considered to typically be the frequency is actually the angular frequency of the system. This equation will be used later to understand pair production of an electron positron pair from two photons. Since w and f only differ by a scalar, the overall behavior of the system is still consistent with expectations.

I call this model the Giertz Photon Model. Hans W. Giertz proposes the idea of a photon being constructed from two equal but opposite charges in his paper, The Photon Consists of a Positive and Negative Charge [1]. The idea of light charges from his paper heavily influences this paper.

Electron Properties from Light Charges:

The electron, as a fundamental particle with mass and electric charge, is also postulated to be a configuration of light charges, as seen in **Figure 3**. The hypothesis proposes that the properties of electrons, such as their mass, charge, spin, and behavior in electromagnetic fields, can be derived from the underlying structure and dynamics of light charges.

The electron is made of two oppositely charged light charges in four spatial dimensions. The charges, of magnitude, sqrt(ε0 * h * c), move in a pattern of a circular orbit. The orbits are almost overlapping, with a slight tilt that results in a

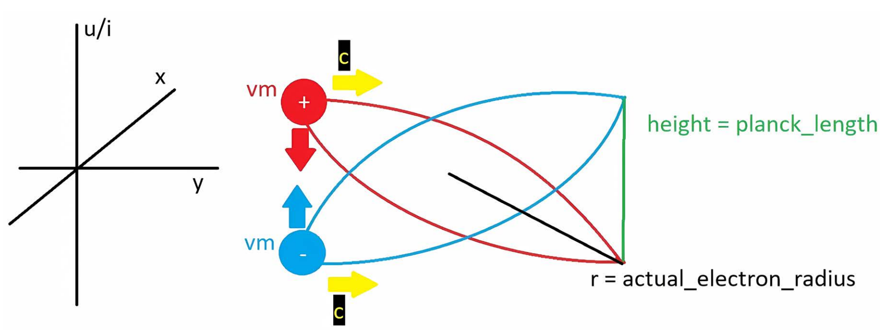

Figure 3. A single electron, constructed of two orbiting light charges, with a net velocity of 0 m/s.

maximum height differential of planck length at the edges. Of note, the actual electron radius for an electron at rest, is not the classical electron radius. This discrepancy is responsible for the appearance of the fine structure constant.

In this model, the actual electron radius comes from analyzing Einstein's equation, $E^2 = m^2 * c^4 + p^2 * c^2$ [2]. Analyzing a system of light charges with no net velocity, as in **Figure 4**, one first looks at $E = m * c^2$. However, from the light charge perspective, the light charges in the electron are not at rest even when the net velocity of the electron is zero. This point leads to an analysis of mass from the light charge model perspective. Looking at an artificial system below and adding up all the vectors with momentum, the net energy of the system is zero.

However, since energy can neither be created nor destroyed, it must be converted into a system that has mass. From this insight, one can find the momentum of the electron by setting $p * c = m * c^2$. This gives $p = m * c$.

In this case, since two photons can hit each other and result in the pair production of an electron and a positron, one can just consider the energy of one photon as equivalent to an electron where the variable velocities are equivalent. Therefore, by substituting p for the photon equation of $p = h$/lambda, the following equation is found. Lambda = $h/(m * c)$.

This equation may look familiar. It is the Compton Wavelength. The next part is a little more dubious, it involves assuming that this wavelength is the circumference of the electron. Originally, I assumed it was the diameter as the projection of 4 spatial dimensions against 3 spatial dimensions. Making this assumption, the radius of the electron is the following. Actual electron radius = h/(mass of electron * 2 * pi * c) = 3.86159273e−13 m. Interestingly, the actual electron radius/the classical electron radius = 137.06000. This number is the same as that seen in the fine structure constant, 137.05999084.

Now that the actual electron radius is known, this model can determine the effective charge for the electron. We consider the energy of the system to be $E = q * V$ where q is the charge and V is the voltage. $V = k * q/r$. Therefore, for the two light charge electron model, the energy is $E = 2 * k * qp^2$/actual_electron_radius. However, according to the classical model, there is only one effective

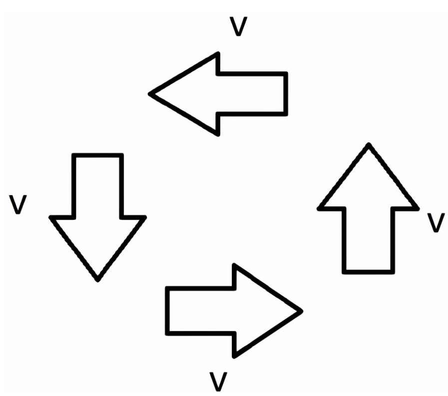

Figure 4. A hypothetical arrangement where the orientation of the velocity vectors causes the net velocity and therefore net momentum to be zero.

charge, *qe*, with a classical electron radius. When we try to fit the two light charges model into the classical model, the following occurs.

$$2 * k * qp^2/\text{actual\_electron\_radius} = k * qe^2/\text{classical\_electron\_radius}$$

Solving for qe, one obtains the following. Qeffective = 1.60217662e−19 C. The elementary charge is 1.60217663e−19 C. Therefore, the elementary charge may only be the effective charge of a system where the radius is incorrectly assumed to be the classical electron radius. It may not be elementary after all.

Next, it's time to consider the source of the electron's mass. Although the light charges have no mass, one can determine the energy of the system, and then use the equation, $E/c^2 = m$, to come to the mass.

$$m = \frac{E}{c^2}$$

$$m = 2 \cdot q \cdot \varepsilon \cdot d \cdot \frac{1}{c^2}$$

$$q = \sqrt{\varepsilon_0 \cdot h \cdot c}$$

$$d = \text{actual-electron-radius}$$

$$\varepsilon = \text{electric field} = k \cdot \frac{q}{\text{actual-electron-radius}}$$

$$m = \frac{h}{c \cdot 2 \cdot \pi \cdot \text{actual-electron-radius}}$$

This result is consistent with interpreting the Compton Wavelength as the circumference and gives the following mass of 9.1093836e−31 kg. The measured value of the mass for an electron is 9.1093837e−31 kg.

Next, the angular momentum of the system is calculated. For a spinning disk, the angular momentum is the following.

$$L = \text{angular momentum of a spinning disk}$$

$$L = \pi \cdot m \cdot f \cdot r^2$$

$$m = \frac{h}{c \cdot 2 \cdot \pi \cdot \text{actual-electron-radius}}$$

$$T = \text{period} = \frac{1}{f} = \frac{\text{distance}}{\text{velocity}} = \frac{2 \cdot \pi \cdot \text{actual-electron-radius}}{c}$$

$$f = \frac{c}{2 \cdot \pi \cdot \text{actual-electron-radius}}$$

$$r = \text{actual-electron-radius}$$

$$L = \frac{h_{bar}}{2}\left(\text{kg} \cdot \frac{\text{m}^2}{\text{sec}}\right)$$

The angular momentum of the system is $h_{bar}/2$. Spin originally obtained its name since the electron behaves as if it is spinning when hitting other objects. From this model, the same spin is determined simply by calculating the angular momentum of the system.

Comparison with Established Theories:

One can see that instead of relying on the properties of an electron, like mass, charge, and spin, to be experimentally measured, they can be found with relative ease with this model. Additionally, the equation of the photon, like $c = f^*$ lambda, can be understood and derived from this model, and it explains why photons with high frequencies have more energy. The potential advantage of this model is that even if it is as correct as the standard model, it is much easier to wield and understand.

3. Minimum Frequency for Pair Production

The proposed mechanism for minimum frequency for pair production from the light charge hypothesis offers a unique perspective on the role of light charges in the dynamics of pair production phenomena. It focuses on the idea that four light charges *into* the system are transformed into four light charges with different orientations *out* of the system. Namely, the two incoming photons have two light charges each, and are transformed into an electron positron pair of two light charges each, as seen in **Figure 5**. In this model, an electron and positron are almost the same, but rotate in opposite directions about the u/imaginary spatial axis.

To understand pair production from the light charge hypothesis perspective, one must look at the structure of an electron. The two light charges orbit around the actual electron radius at speed *c*. However, in the course of one orbit, the variable velocity must make it to the other side of the height of planck length and back in the course of one cycle. Otherwise, the variable velocity magnitude is too

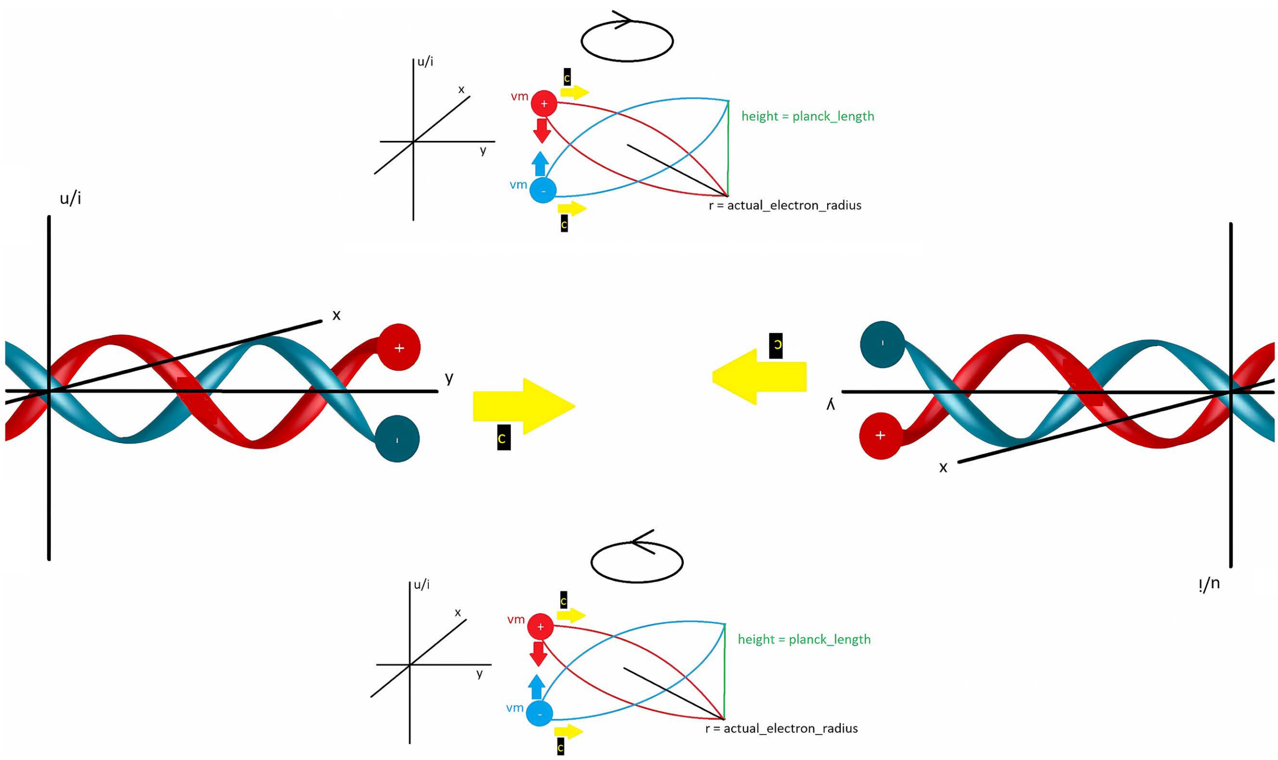

Figure 5. In a pair production event, two incoming photons collide and then transform into an electron and positron pair.

low to create a stable orbit of the electron structure. Based on the hypothetical electron structure, this value can be calculated. The time it takes for one orbit around the actual electron radius to complete must equal the time it takes for the variable velocity to go the planck length and back.

$$\text{time1} = \frac{\text{distance1}}{\text{velocity1}}$$

$$\text{time2} = \frac{\text{distance2}}{\text{velocity2}}$$

$$\text{time1} = \text{time2}$$

$$\frac{2 \cdot \text{planck-length}}{v} = \frac{2 \cdot \pi \cdot \text{actual-electron-radius}}{c}$$

$$v = \frac{2 \cdot \text{planck-length} \cdot c}{2 \cdot \pi \cdot \text{actual-electron-radius}}$$

Next, we consider the effective photon necessary for this velocity.

$$c = w \cdot \lambda$$

$$w = 2 \cdot \pi \cdot f$$

$$2 \cdot \pi \cdot \text{planck-length} \cdot f = v$$

$$f = \frac{v}{2 \cdot \pi \cdot \text{planck-length}}$$

$$w = \frac{v}{\text{planck-length}}$$

$$w = \frac{c}{2 \cdot \pi \cdot \text{actual-electron-radius}}$$

$$w = 2.47117989\text{e}20 \text{ Hz}$$

This result matches the experimental value of 2.471e20 Hz. The explanation for the minimum frequency is structural and easy to understand.

4. Gravity from Light Charges

Gravity is fundamental in nature, described by Einstein's theory of general relativity as the curvature of space-time caused by mass and energy. The light charge hypothesis proposes a unique perspective on the nature of gravity, suggesting that gravity may arise from the collective behavior of light charges.

In the light charge hypothesis, light charges are proposed to be ubiquitous in the universe, constituting the fundamental building blocks of particles and fields. These light charges are hypothesized to be distributed in higher-dimensional space, moving along their orbits or trajectories, and interacting with each other through electromagnetic interactions as described in previous sections.

The light charge hypothesis further proposes that the familiar equations of general relativity, which describe the curvature of space-time by mass and energy, can be derived from the dynamics and properties of light charges in the higher-dimensional space. The specific mechanisms by which this phenomenon occurs are described below.

Surprisingly, at this point, all of the components necessary to understand gravity are in place. From the structure of the electron, one considers that the magnetic lorentz force, $F = 2 * qp * (v \times B)$ exerted by the electron is equivalent to the known force, $F = m * a * (1/(\text{sqrt}(1 - v^2/c^2))$. Setting up this equation and solving for the acceleration leads to the following.

$$-2 \cdot q \cdot (v_c \times B) = m \cdot a \cdot \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$$

$$m = \text{mass of electron} = \frac{h}{\text{actual-electron-radius} \cdot c \cdot 2 \cdot \pi}$$

$$-2 \cdot q \cdot (v_c \times B) = \frac{h}{\text{actual-electron-radius} \cdot c \cdot 2 \cdot \pi} \cdot a \cdot \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$$

$$q1 = q2 = q = \sqrt{\varepsilon_0 \cdot h \cdot c}$$

$$v = \text{velocity of an electron} = v1 = v2$$

$$v_c = \text{velocity of a light charge}$$

$$c^2 = \frac{1}{\varepsilon_0 \cdot \mu_0}$$

$$-2 \cdot q^2 \cdot v_c^2 \cdot \mu_0 \cdot \frac{1}{4 \cdot \pi \cdot r^2} = \frac{h}{\text{actual-electron-radius} \cdot c \cdot 2 \cdot \pi} \cdot a \cdot \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$$

$$-2 \cdot \varepsilon_0 \cdot h \cdot c \cdot v_c^2 \cdot \mu_0 \cdot \frac{1}{4 \cdot \pi \cdot r^2} = \frac{h}{\text{actual-electron-radius} \cdot c \cdot 2 \cdot \pi} \cdot a \cdot \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$$

$$\varepsilon_0 \cdot \mu_0 \cdot c \cdot c \cdot h \cdot \frac{1}{h} \cdot -2 \cdot 2 \cdot \frac{1}{4} \cdot \frac{1}{\pi} \cdot \pi \cdot v_c^2 \cdot \frac{1}{r^2} = \frac{1}{\text{actual-electron-radius}} \cdot a \cdot \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$$

$$-1 \cdot v_c^2 \cdot \frac{1}{r^2} = \frac{1}{\text{actual-electron-radius}} \cdot a \cdot \frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$$

$$a = -1 \cdot v_c^2 \cdot \frac{1}{r^2} \cdot (\text{actual-electron-radius}) \cdot \sqrt{1-\frac{v^2}{c^2}}$$

Next, it's time to analyze pair production. Two photons can combine to form an electron and positron with equal energies. The energy of an object with mass according to Einstein's equation is, $E^2 = m^2 * c^4 + p^2 * c^2$.

$$E = h \cdot f = \sqrt{m^2 \cdot c^4 + p^2 \cdot c^2}$$

For the frequency of the photons, we determined earlier the following relationship.

$$2 \cdot \pi \cdot \text{planck-length} \cdot f = v_c$$

$$f = \frac{v_c}{2 \cdot \pi \cdot \text{planck-length}}$$

$$h \cdot \frac{v_c}{2 \cdot \pi \cdot \text{planck-length}} = \sqrt{m^2 \cdot c^4 + p^2 \cdot c^2}$$

Also, when looking at p, the momentum of the electron, it is necessary to factor in the Lorentzian version.

$$p = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} \cdot m \cdot v$$

It is important to make a distinction between the velocity of the light charge and the net velocity of the electron.

This step is specifically taken in order to determine the relation between v_c and v.

$$h \cdot \frac{v_c}{2 \cdot \pi \cdot \text{planck-length}} = \sqrt{m^2 \cdot c^4 + \left(\frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} \cdot m \cdot v \right)^2 \cdot c^2}$$

$$h \cdot \frac{v_c}{2 \cdot \pi \cdot \text{planck-length}} = \sqrt{m^2 \cdot c^4 + \left(\frac{1}{\sqrt{1 - \frac{v^2}{c^2}}} \cdot m \cdot v \right)^2 \cdot c^2}$$

$$v_c = \frac{1}{h} \cdot 2 \cdot \pi \cdot \text{planck-length} \cdot \sqrt{m^2 \cdot c^4 + \frac{1}{1 - \frac{v^2}{c^2}} \cdot m^2 \cdot v^2 \cdot c^2}$$

$$v_c = \frac{1}{h} \cdot 2 \cdot \pi \cdot \text{planck-length} \cdot \sqrt{m^2 \cdot c^2 \cdot \left(c^2 + \frac{1}{1 - \frac{v^2}{c^2}} \cdot v^2 \right)}$$

$$v_c = \frac{1}{h} \cdot 2 \cdot \pi \cdot \text{planck-length} \cdot \sqrt{m^2 \cdot c^2 \cdot \left(c^2 + \frac{1}{\frac{c^2 - v^2}{c^2}} \cdot v^2 \right)}$$

$$v_c = \frac{1}{h} \cdot 2 \cdot \pi \cdot \text{planck-length} \cdot m \cdot c \sqrt{c^2 + \frac{c^2 \cdot v^2}{c^2 - v^2}}$$

$$v_c = \frac{1}{h} \cdot 2 \cdot \pi \cdot \text{planck-length} \cdot m \cdot c \cdot c \sqrt{1 + \frac{v^2}{c^2 - v^2}}$$

$$v_c = \frac{1}{h} \cdot 2 \cdot \pi \cdot \text{planck-length} \cdot m \cdot c \cdot c \sqrt{\frac{c^2 - v^2 + v^2}{c^2 - v^2}}$$

$$v_c = \frac{1}{h} \cdot 2 \cdot \pi \cdot \text{planck-length} \cdot m \cdot c^2 \cdot \sqrt{\frac{c^2}{c^2 - v^2}}$$

$$v_c = \frac{1}{h} \cdot 2 \cdot \pi \cdot \text{planck-length} \cdot m \cdot c^3 \cdot \sqrt{\frac{1}{c^2 - v^2}}$$

Now, plug this relation back into the original equation for acceleration.

$$v_c^2 = 4 \cdot \frac{1}{h^2} \cdot \pi^2 \cdot \text{planck-length}^2 \cdot m^2 \cdot c^6 \cdot \frac{1}{c^2 - v^2}$$

$$a = -1 \cdot v_c^2 \cdot \frac{1}{r^2} \cdot \text{actual-electron-radius} \cdot \sqrt{1 - \frac{v^2}{c^2}}$$

$$a = -1 \cdot 4 \cdot \frac{1}{h^2} \cdot \pi^2 \cdot \text{planck-length}^2 \cdot m^2 \cdot c^6 \cdot \frac{1}{c^2 - v^2} \cdot \frac{1}{r^2} \cdot \text{actual-electron-radius} \cdot \sqrt{1 - \frac{v^2}{c^2}}$$

$$\text{actual-electron-radius} = \frac{h}{m \cdot c \cdot 2 \cdot \pi}$$

$$a = -1 \cdot 4 \cdot \frac{1}{h^2} \cdot \pi^2 \cdot \text{planck-length}^2 \cdot m^2 \cdot c^6 \cdot \frac{1}{c^2 - v^2} \cdot \frac{1}{r^2} \cdot \frac{h}{m \cdot c \cdot 2 \cdot \pi} \cdot \sqrt{1 - \frac{v^2}{c^2}}$$

$$a = -1 \cdot 2 \cdot \frac{1}{h^2} \cdot h \cdot \pi^2 \cdot \frac{1}{\pi} \cdot \text{planck-length}^2 \cdot m^2 \cdot \frac{1}{m} \cdot c^6 \cdot \frac{1}{c} \cdot \frac{1}{c^2 - v^2} \cdot \frac{1}{r^2} \cdot \sqrt{1 - \frac{v^2}{c^2}}$$

$$a = -2 \cdot \pi \cdot \frac{1}{h} \cdot \text{planck-length}^2 \cdot m \cdot c^5 \cdot \frac{1}{c^2 - v^2} \cdot \frac{1}{r^2} \cdot \sqrt{1 - \frac{v^2}{c^2}}$$

Next, it's necessary to use the relationship relating the planck length to the gravitational constant, *G*.

$$\text{planck-length}^2 = \frac{h \cdot G}{2 \cdot \pi \cdot c^3}$$

$$\frac{1}{h} \cdot \text{planck-length}^2 = \frac{G}{2 \cdot \pi \cdot c^3}$$

$$a = -2 \cdot \pi \cdot \frac{G}{2 \cdot \pi \cdot c^3} \cdot m \cdot c^5 \cdot \frac{1}{c^2 - v^2} \cdot \frac{1}{r^2} \cdot \sqrt{1 - \frac{v^2}{c^2}}$$

$$a = -1 \cdot G \cdot m \cdot c^2 \cdot \frac{1}{c^2 - v^2} \cdot \frac{1}{r^2} \cdot \sqrt{1 - \frac{v^2}{c^2}}$$

$$a = -1 \cdot G \cdot m \cdot \frac{1}{1 - \frac{v^2}{c^2}} \cdot \frac{1}{r^2} \cdot \sqrt{1 - \frac{v^2}{c^2}}$$

$$a = -1 \cdot G \cdot m \cdot \frac{1}{r^2} \cdot \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$$

The proposed connection between gravity and light charges in the light charge hypothesis offers a novel approach to understanding the fundamental nature of gravity and its relation to the underlying structure of the universe. It shows that the gravitational acceleration is an inherent characteristic of objects that have mass. It provides a framework for exploring the implications of the light charge hypothesis for gravitational phenomena at various scales, from the behavior of celestial objects to the dynamics of galaxies and the large-scale structure of the universe.

5. Speculative Analysis

The next sections will cover black holes, a way to regain the quantum wavefunction from the light charge model, a dark matter candidate, and a potential way to uncover the proton and neutron structures.

5.1. Black Holes and Schwarzschild Radius

Using the pair production trick from earlier, the Schwarzschild Radius receives another examination.

$$r_s \leq 2 \cdot G \cdot m \cdot \frac{1}{c^2}$$

For pair production:

$$m = h \cdot f \cdot \frac{1}{c^2}$$

For a photon:

$$2 \cdot \pi \cdot \text{planck-length} \cdot f = v$$

We consider a black hole where $r_s = \text{planck-length} = l_p$

$$l_p \leq 2 \cdot G \cdot h \cdot \frac{v}{2 \cdot \pi \cdot l_p} \cdot \frac{1}{c^2} \cdot \frac{1}{c^2}$$

$$l_p^2 \leq G \cdot h_{bar} \cdot \frac{1}{c^3} \cdot \frac{v}{c}$$

$$1 \leq \frac{v}{c}$$

$$v \geq c$$

This seems like an odd result. What if there is something odd about the planck length. Let's consider a Schwarzschild Radius, r_s, where it is greater than the planck length such that $r_s = a * l_p$ where $a \geq 1$. Such an exercise leads to the following.

$$v \geq c \cdot a$$

This result implies that for a Schwarzschild Radius ≥ planck length, the variable velocity of the light charges that make up the black hole must be greater than or equal to the speed of light. At first, this result seems like a mistake. How could the charges be moving faster than the speed of light. However, understanding the structure of the black hole explains why Einstein's equations break down near a black hole. He thought that nothing could move faster than the speed of light and tied the passage of time to this constant. Therefore, having light charges move faster than the speed of light could not be accounted for in his equations. Black holes are basically quantum objects whose energy is so great that its effects can be seen at a macroscopic scale. A picture of a speculative potential black hole object is shown in **Figure 6** below.

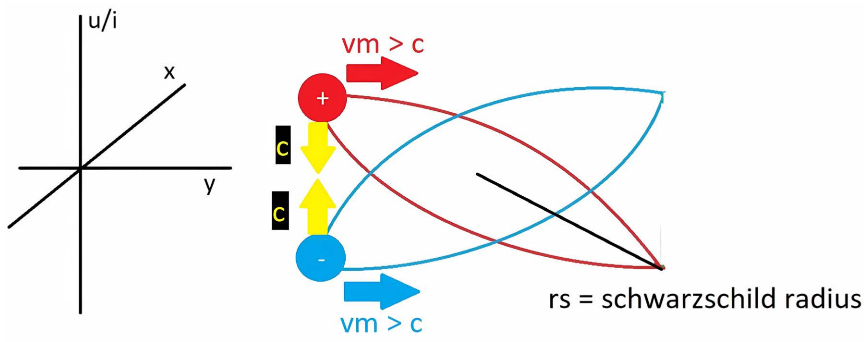

Figure 6. A potential candidate for a black hole constructed of two light charges.

Potentially understanding black holes gives me great hope for the future! It seems that faster than light travel may be possible after all. You can take an object, deconstruct it into its constituent light charges, rev those light charges past the speed of light, fling them through the tunnel/stargate so they travel without interference, and then reconstruct them at the other end. In Einstein's framework, structures with mass can't move faster than the speed of light. This is true since they would break apart or become a black hole at that point. However, if you break them into their light charges first, you can bypass that limit.

5.2. How to Build the Quantum Wave Function from the Light Charge Model

Let's analyze the photon again. Let's look at it from a different angle. Namely, instead of looking at it from the side, we look in the cross section of its direction of propagation (**Figure 7**).

Looking at it, one can see that we have the unit circle across the x axis and the 4th spatial dimension axis, u/i.

$$z = e^{i\cdot\theta}$$

$$\theta = 2\cdot\pi\cdot f\cdot t$$

$$w = 2\cdot\pi\cdot f$$

$$z = e^{iwt}$$

$$f(t) = \sum_{-\infty}^{\infty} f(w)\cdot e^{i\cdot w\cdot t}$$

For theta, one realizes that this represents 2 * pi * f * t for a photon. Also, angular frequency = 2 * pi * f. Plugging this in, one gets a familiar term to describe the photon. However, between adding up all the photons in the system via a surface graph of $f(w)$ which indicates the number of each type of photon for each point, one knows the total state of the system as denoted by $f(t)$.

Well, if this term fundamentally represents w for a photon, then one can make some substitutions based on this knowledge.

$$w = 2\cdot\pi\cdot f$$

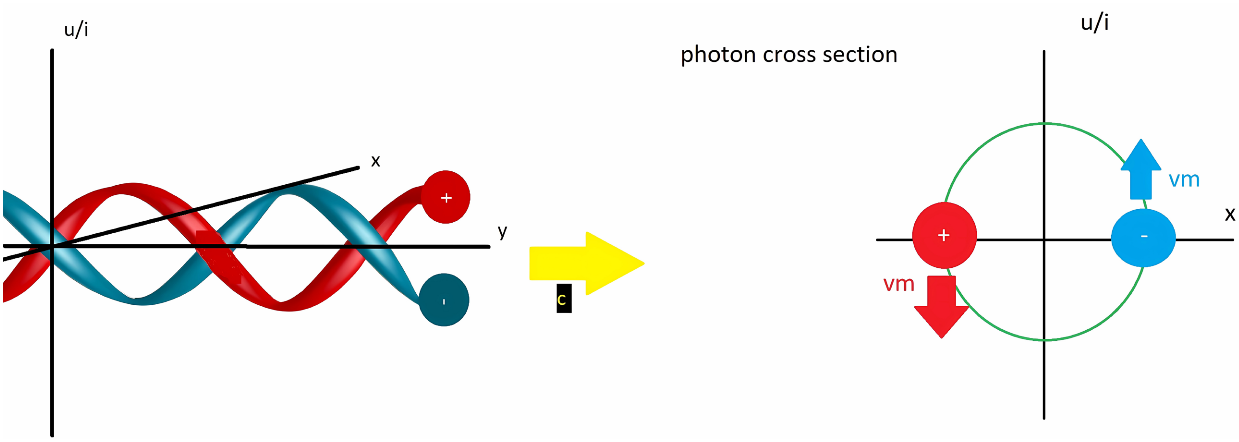

Figure 7. The trajectory of a photon shown from a 3D i/x/y perspective and a simpler 2D i/x perspective.

$$E = h \cdot f$$

$$E = p \cdot c$$

$$h = h_{bar} \cdot 2 \cdot \pi$$

$$c = \frac{x}{t}$$

$$h \cdot f = p \cdot c$$

$$f = \frac{p \cdot x}{t \cdot 2 \cdot \pi \cdot h_{bar}}$$

$$w = \frac{p \cdot x}{t \cdot h_{bar}}$$

$$f(t) = \sum_{-\infty}^{\infty} f(w) \cdot \mathrm{e}^{i \cdot w \cdot t}$$

$$\Psi(x) = \sum_{-\infty}^{\infty} \Phi(p) \cdot \mathrm{e}^{\frac{i \cdot p \cdot x}{h_{bar}}}$$

You'll notice an odd substitution enters into this system. Namely, it seems wrong to set $c = x/t$. In other words, this sets a generic velocity equal to c for the period of one cycle for a photon. Strange, wouldn't such a step cause the need for another condition? Why yes, it would. This other paired condition is typically considered to be the uncertainty principle.

$$h \cdot f = p \cdot c$$

$$f = \frac{1}{\Delta t}$$

$$c = \frac{\Delta x}{\Delta t}$$

$$h \cdot \frac{1}{\Delta t} = p \cdot \frac{\Delta x}{\Delta t}$$

$$h = p \cdot \Delta x$$

This result implies that although the equations for quantum mechanics are of course correct, the Coppenhagen Interpretation of probabilities and uncertainties can be put to rest. The equations are built from a fundamentally deterministic system with the "uncertainty" arising only because of an odd substitution of a generic velocity for *c*.

5.3. A New Dark Matter Candidate

From the perspective of the light charge hypothesis, one can get momentum, $e*V/c$, when constraining the light charges' motion by one degree of freedom such as in the photon. One can get mass, $e*V/c^2$, when constraining the light charges' motion by two degrees of freedom such as in the electron. However, this paper has thus far only considered objects of small orbits that stay close to our 3d hyperplane, only dipping on the order of planck length into the 4th spatial dimension, which is typically considered imaginary.

However, what if you had a structure like that of an electron, except that radius was the same as that of our galaxy with thousands of diffuse light charges or photons following those orbits? Most of the light charges would not be in our hyperplane, yet they would still affect the mass and gravity of our galaxy. Such a structure could be a source of dark matter. However, surely there would be some evidence of such a structure.

What if you had a huge orbit of light charges moving through a trajectory that traverses almost perpendicular to our 3d hyperplane, but then it gets smacked by a light charge moving in the opposite direction? Well, you could get pair production. If it is perfectly perpendicular, they might stay in our hyperplane, otherwise, they would fluctuate back out of our plane. I think this process is the explanation for quantum fluctuations.

5.4. Proton and Neutron Models

Although I'm not sure what proton and neutron structures are, I'm very interested in what I call the Robinson Models. Dr. Vivian Robinson has a book, How to Build a Universe [3], that investigates proton and neutron structures. His model assumes that electrons are made of wrapped photons rather than specific charges orbiting themselves in a circle. Obviously, this model is different, however, they both effectively treat electrons of rings of some kind. He then does analysis and shows how protons and neutrons could be made of different sets of interlocking rings.

6. Methods to Test the Hypothesis

Although a clever experimentalist might find a way to test this hypothesis in the lab, my hope for a path to validation would be to create simulations that match known experimental results. Since according to this hypothesis the light charges behave in a deterministic fashion, they should be amenable to simulations.

There is a glaring current problem with this approach. The current laws that govern the trajectories of these massless light charges are not yet known. However, each light charge should interact with every other light charge at every delta time in the same way with the only differences due to being either a positive or negative charge, and the trajectory relative to the other light charges. Such a program should be able to recreate scattering experimental data of how a photon and electron scatter from each other.

If no such program could ever be derived to match experiments at a fundamental level, then that impasse would count as invalidating the idea. I have been working on the models at the more abstract levels to gain more insights about how this behavior should be described at the bare bones in code. It is a work in progress.

7. Conclusions

The light charge hypothesis presents a novel perspective on the nature of elementary particles, electromagnetic interactions, gravity, and the underlying structure of the universe. By proposing that light charges, which are hypothesized to be fundamental building blocks of particles, are distributed in higher-dimensional space and interact with each other through electromagnetic interactions, the hypothesis offers a unique framework for understanding the properties and behavior of elementary particles.

The light charge hypothesis suggests that the structure and properties of particles such as photons and electrons can be derived from the dynamics and interactions of light charges in higher-dimensional space. It further proposes that the collective behavior of light charges may give rise to the phenomenon of gravity, and that the familiar equations of general relativity can be derived from the dynamics of light charges.

The proposed light charge hypothesis also offers potential explanations for other puzzling phenomena in the universe, such as black holes and dark matter. Black holes, which are thought to be extremely dense objects with strong gravitational effects, may be understood as structures with light charges that move faster than the speed of light. Dark matter, which is hypothesized to make up a significant portion of the mass in the universe, may be attributed to the presence of light charges in the higher-dimensional space that orbit around our galaxies, and only interact in a way for us to see through quantum fluctuations.

Despite its theoretical promise, the light charge hypothesis also presents challenges that need to be addressed in future research. For example, the detailed mechanisms which govern each light charges trajectory need to be further investigated. Additionally, the proposed connection between gravity and light charges may have implications for experimental observations of gravity that can be explored in future experiments and observations.

In conclusion, the light charge hypothesis offers a unique perspective on the nature of elementary particles, electromagnetic interactions, gravity, and the structure of the universe. It provides a framework for further investigation and exploration of the underlying mechanisms and implications of the hypothesis, and has the potential to shed light on some of the longstanding questions in modern physics. Further theoretical, experimental, and observational studies are warranted to validate and expand upon the ideas presented in this paper, and to advance our understanding of the fundamental nature of the universe.

Conflicts of Interest

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

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