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Another Take on the Musakhail-Farmer Gravitational Aether: The Krueger-Farmer Gravitational Aether

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ABSTRACT

This paper examines the proposed roles of the Higgs boson and the Reverse Higgs boson in relation to metallic lattice states and gravitational aether. The Higgs boson is treated as producing protons from positrons, whereas the Reverse Higgs boson is associated with conversions between massive fermions and photons. Three possible metallic-lattice configurations are considered: the spherical metallic photon, the Bohr atom, and the Thomson atom. These states are then related to a proposed duality between Newtonian gravitational force and Einsteinian space-time curvature. Within the model, gravitational force is associated with nuclei and with gravitons propagating along tensioned electromagnetic field lines. When a nucleus is absent at the field point, residual space-time curvature remains and acts on non-nuclear entities. Spherical metallic photons and Thomson atoms are therefore assigned a "phantom nucleus" so that they can function as gravitational sources. The Krueger-Farmer gravitational-aether interpretation is developed by relating gravitational interaction to nuclear motion and to two closely spaced characteristic frequencies. The paper also compares four states of matter, including the Schrödinger atom, and examines de Broglie relations, fermionic-wave amplitude, multiple-electron Bohr atoms, and non-orthogonality of Bohr orbits. Finally, the proposed graviton mass-speed relation is compared with the uncertainty principle in an attempt to connect quantum mechanics with gravity within the author's M-theory framework.

Keywords: Higgs boson; Reverse Higgs boson; gravitational aether; Bohr–Schrödinger atomic models.

1. INTRODUCTION

We start with the dual Maxwellian photon, following the framework developed in the author's earlier works [1,2]. We consider the electromagnetic wave together with either a positron propagating on the E-vector and an electron ghost on the B-vector (positronic photon), or an electron propagating on the B-vector and a positron ghost propagating on the E-vector (electronic photon).

A ghost has all the properties of the fermion mass, energy, spin, speed but it does not have electric charge. As illustrated in Figure 1, the photons propagate out of the page. Thus, the energy of the photon is:

$$E = E(\text{fermion}) + E(\text{ghost}) \quad (1)$$

$$E = \frac{1}{2}m_e c^2 + \frac{1}{2}m_e c^2 \quad (2)$$

$$E = m_e c^2 \quad (3)$$

That is the photon energy in the naked Reverse Higgs process, in which the fermion is stationary before it is accelerated onto the electromagnetic wave packet. Thus, $h\nu = h\nu_e = m_e c^2$.

In the general case the "energy input scenario" the massive fermion has kinetic energy, KE, positive or negative, with $v \neq 0$, prior to Reverse Higgs boson acceleration. In this case, the photon energy is variable, so we have the following law for the mass of photons:

$$m = \frac{h\nu}{c^2} \quad (4)$$

We deduce, therefore, that the spin of a photon is given by:

$$\text{Spin(photon)} = \text{spin(fermion)} + \text{spin(ghost)} \quad (5)$$

$$\text{Spin(photon)} = \pm\tfrac{1}{2} \pm \tfrac{1}{2} \quad (6)$$

$$\text{Spin(photon)} = 0, \pm 1 \quad (7)$$

as we would expect. We now turn our attention from dual Maxwellian photons to gauge bosons, the "messenger particles" that transmit the various fundamental forces.

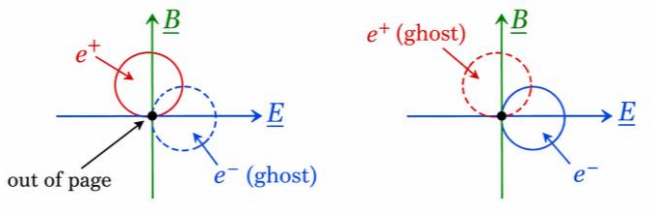

Figure 1. Positronic and electronic photons propagating out of the page.

The various gauge bosons (GBs) carry various numbers of ghosts, except for a couple that carry no ghosts and one or two fermions. Reflecting on something I heard around 2019 - that the graviton has spin 2 - it occurred to me that this would imply that a graviton carries four ghosts, two ghosts propagating on the E-oscillation of the Maxwellian wave and two on the B-oscillation. Thus:

$$\text{Spin(graviton)} = \tfrac{1}{2} + \tfrac{1}{2} + \tfrac{1}{2} + \tfrac{1}{2} = 2 \quad (8)$$

and, with this, I was on my way to what I call "Grand Unification" [1].

Table 1

Force	ghosts in GB	Speed of GB
Gravity	4	v > c
Electro-grav (General Relativity)	3	c
Electromagnetic	2	c
Electroweak	1	c
Weak	0	c
Weak-Strong	-1	c
Strong	-2	c

So, we interpret "-1 ghosts" to mean one fermion, and "-2 ghosts" to mean two fermions. The electromagnetic GB, with 2 ghosts one propagating on the E-vector and one on the B-vector is identically what we call the "Reverse Higgs boson." Carrying no fermions, it is identically what Maxwell was unwittingly describing, although his analysis also incorporates electromagnetic radiation, an equal mixture of electronic and positronic photons, because again this is satisfied by $\rho = J = 0$; in this instance, the photons are charged, but there is an equal mixture of positive and negative ones.

Whether it is dual Maxwellian radiation or the electromagnetic GB, the "Reverse Higgs boson," it is necessary to set $\rho = J = 0$ in order to find a solution to Maxwell's equations, and when one does so, one finds:

$$v = c = \frac{1}{\sqrt{\mu\varepsilon}} \quad (9)$$

For standard background on the Higgs boson, wave mechanics, and early atomic theory, see [3-7]. What does it mean for the weak interaction to have zero ghosts? It means one ghost, with one electroweak GB propagating in one direction and another in the other direction, giving no net transport of ghosts "0 ghosts.".

These singular ghosts, or electroweak GBs, are identically what we call "neutrinos." No net transport of neutrino implies no net transport of electroweak GB. The weak-strong GB is the charge carrier we observe internally within electrical circuits: a positively charged, positronic WSGB in one axial direction, and a negatively charged, electronic WSGB in the other.

Figure 2. Axial view of the circuit, showing positronic WSGB propagating into the page and electronic WSGB propagating out of the page.

Note here that we have only a singular oscillation, only one oscillating field, E/B, not Maxwell's dual electromagnetic wave. Most particularly, there is no ghost, because there is no orthogonal oscillation to carry the ghost. However, the WSGB has what we call a potential ghost. We now turn to the strong GB. "-2 ghosts" implies two fermions. We have a dual Maxwellian oscillation, $E + B$, as opposed to E/B (WSGB).

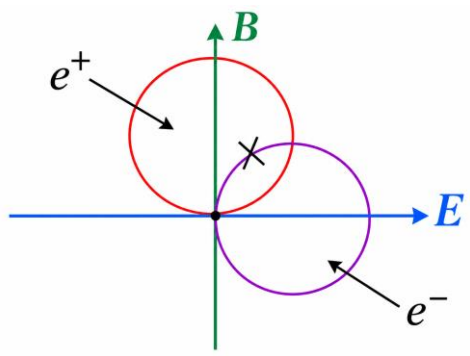

Figure 3. In the case of the strong GB, the two fermions (the neutron) must be displaced axially so that they do not impinge upon one another. One or the other is moved into or out of the page. Accordingly, E and B are out of phase, as in classical electromagnetics.

Thus, an electron propagates on the B-oscillation and a positron propagates on the E-oscillation. Although quantum chromodynamics insist that the GB for the strong force is the gluon, with eight varieties, we take an opposing point of view: namely, that the GB for the strong force is the neutron.
Unlike in the case of the dual Maxwellian photon, the fermion and the ghost are not permitted to impinge upon one another; when both propagation entities are fermions, neither of them is a ghost, and they are likewise not permitted to impinge upon one another.
Therefore, the two fermions must be displaced axially so that they do not impinge upon one another. Hence, in classical **ELECTROMAGNETISM**, we encounter the intriguing prospect of an electromagnetic wave in which the E-oscillation and the B-oscillation have been displaced axially from one another, so that they are no longer in phase.

GAUGE BOSONS

Continuing our analysis of gauge bosons, we refer to Quantum Theory of Electrodynamics (QTE),[2], concerning gauge-boson communications. For any two GBs, the quantity Δ(G.B.) denotes the number of vertical spaces between the two GBs in the table above. We obtain the following results for GB communications:

- Weak-strong ↔ Gravity, Δ(G.B.) = 5.
- Electromagnetic ↔ Gravity, Δ(G.B.) = 2.
- Electro-grav (General Relativity) ↔ Gravity, Δ(G.B.) = 1.

Communication is forbidden for all three of these cases. We therefore use the following communication scheme for GBs:

Table 2:

Δ(G.B.)	Communication allowed or forbidden
0	A
1	F
2	F
3	A
4	A
5	F

Thus, the weak-strong and electromagnetic GBs do not communicate with gravity in isolation (that is, M-theory [8]). Within the author's framework, this facilitates the non-conservation of energy.
The dual Maxwellian photon is assigned the same GB status as the electromagnetic GB: two ghosts versus one ghost and one fermion. The photon and the fermion (we also allow the WSGB the option of becoming massive, $v < c$) do not couple gravitationally; they are affected only by space-time curvature. That is, within this framework, they are not affected by gravitational forces.
This discussion is developed through Newton's law of universal gravitation and its incorporation into the author's M-theory treatment of the gravitational force in isolation [8].

STATES OF LATTICE POINTS IN METALLIC LATTICES

In a metal lattice, lattice points exist in three possible states:

(1) Spherical metallic photon. Fermions orbit on the surface of a sphere. A phantom nucleus is present.

(2) Bohr atom. Outside the metal lattice, atomic existence is described here in terms of the Schrödinger atom, which is treated as distinct from the Bohr atom. In the author's framework, the Schrödinger atom exists outside the metal lattice and participates in chemical reactions, whereas Bohr atoms do not participate in chemical reactions. The Bohr atom possesses a true nucleus rather than a phantom nucleus.

(3) Thomson atom. The Bohr nuclear membrane expands to the dimensions of the lattice point, leaving a phantom nucleus and liberating massive electrons and positrons (the latter from nucleons - protons and neutrons). The protonic positrons are released from their nuclear orbits and can be reinstated later through the operation of what the author calls the "key of David."

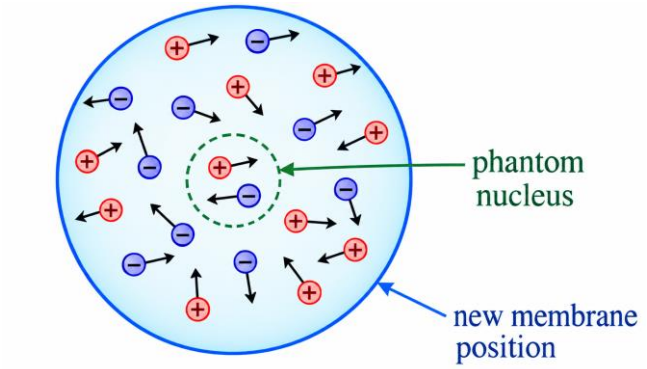

Figure 4. Thomson "plum-pudding" model. The massive fermions (e^+/e^-) are constrained by the nuclear membrane, which has expanded to the dimensions of the lattice point and of the spherical metallic photon, thereby leaving a phantom nucleus that, in the author's model, facilitates gravitational interactions.

The phantom nucleus is necessary when a lattice point is in either the spherical metallic photon state or the Thomson atomic state, so that the metal - as a constituent of a rocky planet - can act as a gravitational source, as it does when the lattice point is in the Bohr state. Waves travelling at $v = c$ are taken here to be Maxwellian waves:

$$\psi = \psi_0 \exp[j(kx - \omega t)] \tag{10}$$

$$v = c = \frac{1}{\sqrt{\varepsilon\mu}} \tag{11}$$

Bohr waves with $v < c$ (in fact, $v < c/10$, so that $m = m_e$ to four or five significant figures) are not necessarily sinusoidal waves in this treatment. They nevertheless possess speed, wavelength, and mass = amplitude, in accordance with the de Broglie relation $mv\lambda = h$.

We call these "ghost waves." This corresponds to the aether oscillation inside the fermion not being a simple harmonic oscillation; rather than $a = -kx/m$, the acceleration is taken to be $a = \pm$ constant. What, then, about gravity? For $v > c$, are these gravitational waves also non-Maxwellian and non-sinusoidal? The author proposes that they may not be, because they are treated as specifically electromagnetic. In this interpretation, waves with $v > c$ are not "ghost waves" of the type associated with Bohr atomic orbits at $v < c/10$; instead, they are sinusoidal, Maxwellian waves. It is the solitary Bohr orbit that is taken to be non-sinusoidal and non-electromagnetic, with the property:

$$m = \frac{m_e}{\sqrt{1-v^2/c^2}} \approx m_e \tag{12}$$

to four or five significant figures because $v < c/10$. The author relates this approximation to an approximately four-significant-figure spectroscopic resolution and notes that Bohr used $m = cte. = m_e$ in his equations.

THE ELECTROMAGNETIC FORCE AND EINSTEIN'S SPECIAL RELATIVITY

In the author's treatment, gravity and gravitons are developed by extending Einstein's analysis of electromagnetism in special relativity. For standard special-relativistic background, see Einstein's 1905 paper [10]. The manuscript uses the following mass-variation relation:

$$m = \frac{m_0}{\sqrt{1-v^2/c^2}} \tag{13}$$

Within the present framework, this is not treated as a ghost wave even though $v \neq c$. Special relativity is associated here with the Maxwellian electromagnetic wave:

$$\psi = \psi_0 \exp[j(kx - \omega t)], \qquad v = c = \frac{1}{\sqrt{\mu\varepsilon}} \tag{14}$$

For the proposed transition from electromagnetism to gravitation, the author then extends the range $v \leq c$ to $v \geq c$. For $v > c$, this introduces the square root of a negative quantity in the denominator, so the graviton mass is taken to become imaginary. Except when v is very close to c, the manuscript uses the approximation:

$$m \sim \frac{m_c}{\sqrt{-v^2/c^2}} = -\frac{m_c j}{\sqrt{v^2/c^2}} = -\frac{m_c jc}{v} \tag{15}$$

When the treatment is extended to the graviton regime, $v \geq c$ (with $v = c$ at electro-grav unification / General Relativity), the manuscript no longer uses the rest mass m_0. Instead, it introduces what the author calls the "c-mass," a constant analogous to m_0, together with a variable m_c analogous to m_0, but for $v \geq c$ rather than $v \leq c$.

This is the value approached when mass m is extrapolated back to $v = c$ from $v > c$, in contrast to m_0, which is obtained by extrapolating upward from $v < c$ to $v = c$.

For the naked Reverse Higgs process, the total mass is taken to be the same before and after the process. For $v \leq c$ and $v \to c$, $m_0 \to 0$ and $m \to m_e$, whereas for $v \to 0$, $m \to m_0 = m_e$. For $v \geq c$, $m_c \to 0$ and $m \to$ c-mass as $v \to c$.

The manuscript further assumes that, for the gravitational interaction, the operation time Δt - the time of passage of the graviton - is independent of the interaction distance. Therefore:

$$\text{Speed(graviton)} \propto \Delta d \tag{16}$$

where Δd is the interaction distance. What geometric operation corresponds to speed being proportional to distance? The author identifies this with rotation: for a body with angular velocity, tangential speed is proportional to the distance from the axis of rotation. The manuscript then connects this idea with the precession of Mercury's perihelion. For standard general-relativistic treatments and experimental tests of the perihelion advance, see [11,12].

Within the author's interpretation, Newton's treatment is retained except for the assumed propagation time of the graviton. Newton treated gravitation as effectively instantaneous, whereas the manuscript introduces a finite passage time. The author proposes that repeating a Newtonian calculation with this delay would yield the perihelion precession. This is presented as an alternative interpretation to the standard space-time-curvature explanation of General Relativity [11,12]; the manuscript further asserts that Newtonian force and space-time curvature are experimentally indistinguishable in this context. When discussing space-time curvature near the field point, the author therefore treats the graviton passage time as non-contributing.

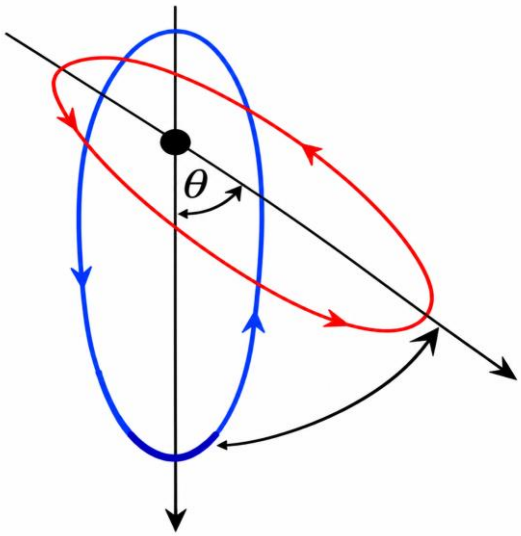

Figure 5. Rotation of the elliptical Newtonian orbit about the solar position at one focus of the ellipse.

Thus:

$$v = v_{\text{grav}} = \alpha R \tag{17}$$

where R is the interaction distance. Hence:

$$m_{\text{graviton}} = -\frac{m_c jc}{\alpha}\frac{1}{R} \tag{18}$$

Consider two nuclei interacting gravitationally from opposite sides of the universe, separated by R. In the manuscript's framework, the graviton speed is exceptionally large while the graviton mass is exceptionally small. Interestingly, the momentum $p = mv$ is then independent of the interaction distance. The manuscript further proposes that the total graviton mass in the universe is zero because every gravitational interaction contributes equal quantities of electric and magnetic gravitons with opposite signs of mass.

THE HIGGS VERSUS THE REVERSE HIGGS

The Reverse Higgs boson is treated in this manuscript as an electromagnetic gauge boson carrying two ghosts. In the naked Reverse Higgs process, $h\nu = h\nu_e = m_e c^2$. It acts on a stationary fermion and delivers that fermion onto the electromagnetic wavepacket of the Reverse Higgs boson as the rest mass m_0 is annihilated. In the reverse process, a Maxwellian photon with $h\nu = h\nu_e = m_e c^2$ is considered; removing the fermion, e^+/e^-, yields a stationary fermion with $m_0 = m_e$ and the emission of a Reverse Higgs boson. For standard experimental background on the Higgs boson, see [3,4]. The manuscript then considers the Higgs boson itself. Within the author's model, it is responsible for the creation of the proton. A stationary massive positron, e^+, is considered under conditions of extreme heat, described as substantially greater than temperatures within the Sun and associated by the author with the Big Bang. Under these conditions, sufficient energy is assumed to be available for the Higgs boson to operate, accelerating the massive positron to $v \approx c$:

$$m = \frac{m_e}{\sqrt{1 - \frac{v^2}{c^2}}} \approx 2000\, m_e \qquad (19)$$

Because v remains less than c, the manuscript continues to regard this as a Bohr ghost wave. The Higgs and Reverse Higgs bosons are then assumed to operate together, propagating in opposite directions and acting in unison, or near unison. In this picture, the Reverse Higgs boson takes a very massive Bohr positron with e^+, $v < c$, $v \approx c$, and $m_0 = m_e \neq 0$, and places it onto an electromagnetic wavepacket with $v = c = 1/\sqrt{\varepsilon\mu}$ and $m_0 = 0$, so that $h\nu = mc^2$.
This is distinguished from the naked Reverse Higgs process, $h\nu = m_e c^2$, because the massive fermion is not stationary before acceleration onto the electromagnetic wavepacket.

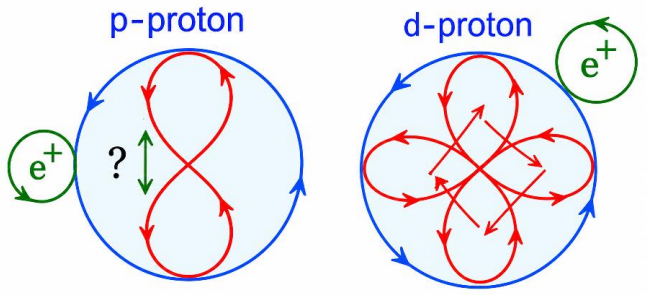

Figure 6. Two proposed varieties of protonic positron orbits, shown by analogy with Schrödinger atomic orbitals and termed the "p-proton" and "d-proton" in the author's model.

The manuscript calls this the "energy input" situation. In this case, the fermion is assumed to be highly energetic before the Reverse Higgs boson removes the rest mass. The positron then occupies what the author calls a "protonic orbit," with $m(p^+) \approx 2000 m_e$, and the fermion on the electromagnetic wavepacket is no longer treated as a ghost wave.

GRAVITATION AND SPACE-TIME CURVATURE

The manuscript first considers the Newtonian gravitational force between two nuclei, n_1 and n_2. A graviton is taken to propagate in one direction and an anti-graviton in the opposite direction, alternatively described as an "electric graviton" and a "magnetic graviton." Within this framework, the electron is treated as a quantum of electric charge and the positron as a quantum of magnetic charge. An alternative description assigns the electron negative electric charge and positive magnetic charge, while the positron is assigned negative magnetic charge and positive electric charge. When electrons and positrons are treated in this manner, the manuscript employs the dual Maxwell equations [2].
Next, the nucleus n_2 at the "field position" is removed. The remaining nucleus n_1 then acts as the source, while e+/e- and ν+/- at the field position are taken to experience space-time curvature. The field-line tension that previously supported the passage of gravitons is assumed to vanish, and the interaction is then described as space-time curvature rather than Newtonian force. All nuclei are treated as sources of both Newtonian gravitational force and Einsteinian space-time curvature. Finally, if the source nucleus n1 is also removed and replaced by e^+, e^-, and $\nu^{+/-}$, the manuscript assigns both zero force and zero space-time curvature.

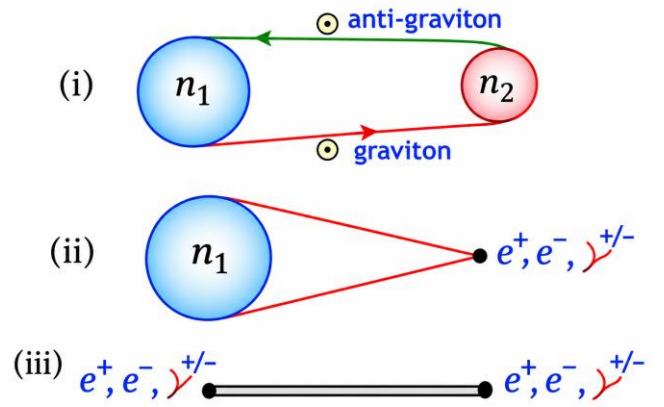

Figure 7. Author's schematic sequence: (i) Newtonian gravitational force with no space-time curvature; (ii) Einsteinian space-time curvature; and (iii) no force and no space-time curvature.

The manuscript therefore concludes that there is no gravitational interaction-neither Newtonian force nor Einsteinian space-time curvature-between non-nuclear fermions e^+ and e^- and bosons $\nu^{+/-}$. Although these entities possess mass, and one might therefore expect interaction through Newton's inverse-square law, the author replaces that interaction in this case with an inverse-square electromagnetic force, consistent with the gravitation–electrodynamics

framework explored in the author's previous work [9]. The relevant standard forms are:

$$F = G\frac{m_1 m_2}{R^2} \quad (20)$$

$$F = \frac{1}{4\pi\varepsilon}\frac{Q_1 Q_2}{R^2} \quad (21)$$

The manuscript further invokes the relativistic energy-momentum relation:

$$E^2 = (pc)^2 + (m_0 c^2)^2 \quad (22)$$

Within the author's framework, $e^+/e^-/\nu^{+/-}$ are treated as belonging to the electromagnetic interaction, whereas protons, p^+, do not participate in the Reverse Higgs process. Conversely, a proton p^+ is taken to undergo both gravitational and electromagnetic interactions with another proton because it does not participate in Reverse Higgs processes. The manuscript further states that Newtonian force and Einsteinian space-time curvature are experimentally indistinguishable in this context. For the standard general-relativistic formulation and experimental tests, see [11,12]. Within the author's framework, however, the Newtonian gravitational force is taken to be zero in this case, whereas the corresponding space-time curvature is not necessarily zero.

SOURCE LOCATIONS IN THE AUTHOR'S PRIOR WORKS

The present discussion draws on several topics developed in the author's earlier works. In *Grand Unification of the Four Fundamental Forces of Physics* [1], relevant material includes electron spin, ghosts, the graviton as the gauge boson of gravity, photon spin, neutrons as gauge bosons, graviton speed, the Higgs and Reverse Higgs bosons, and Thomson's plum-pudding model.

In *Quantum Theory of Electrodynamics* [2], related discussions include electron/electromagnetic-wave coincidence, electron spin, the Higgs boson, multiple spin configurations, gravitational force versus space-time curvature, electromagnetic gauge bosons, the proposed non-conservation of energy, electro-gravitational interactions, Liberty Krueger's gravitational-aether model, the author's gravitational-aether model, the symmetry of the four states of matter, Einstein's proposed "hidden variable," non-orthogonality of Bohr orbits, and the relationship between Bohr and Schrödinger atomic models. Additional background on Quantum Gravity (M-theory) is presented in *A Saucerful of Science* [8].

RESULTS

Higgs Boson and Gravity

When a Higgs boson or a Reverse Higgs boson acts on a fermion or photon, the manuscript assumes that the boson remains associated with the transformed particle thereafter. Thus, the Higgs boson is taken to act on the spherical metallic photon to produce a Thomson atom, after which the Thomson atom carries what the author calls a "Higgs remnant." Similarly, when the Reverse Higgs boson acts on a Thomson atom to produce a spherical metallic photon, the photon is taken to carry a "Reverse Higgs remnant." In this sense, the spherical metallic photon is treated as independent of the Higgs boson, while the Thomson atom is treated as independent of the Reverse Higgs boson.

The spherical metallic photon and the Thomson atom are both assigned an electromagnetic gauge boson, corresponding to no communication with gravity at Δ(G.B.) =2. The manuscript therefore considers the alternative route. The spherical metallic photon is treated as independent of the Higgs boson; whereas the Thomson atom carries a massive fermion, the spherical metallic photon carries a massless fermion, identified in the author's model with the weak-strong gauge boson. Between that weak-strong gauge boson and gravity, the manuscript again assigns no communication, with Δ(G.B.) =5. The spherical metallic photon, which carries no Higgs remnant, is therefore taken not to communicate with gravity through either route.

The Thomson atom is treated differently because, in the author's previous M-theory discussion, the Higgs and Reverse Higgs bosons are assigned a role in quantum gravity [8]. The manuscript further suggests that the massive fermion is not a weak-strong gauge boson because it carries a ghost wave.

The relationship among the three lattice-point states and the Higgs/Reverse Higgs transformations is summarized schematically in the manuscript. The Bohr atom is taken as the intermediate state between the spherical metallic photon and the Thomson atom, with the Higgs and Reverse Higgs bosons mediating the corresponding transformations.

Table 3. Proposed applicability of the Higgs and Reverse Higgs bosons to the lattice-point states

Lattice-point state	Higgs boson	Reverse Higgs boson	eq
Spherical metallic photon	Not applicable (×)	Applicable (✓)	(23)
Thomson atom	Applicable (✓)	Not applicable (×)	(24)

In the Bohr atom, the fermions are massive, as they are in the Thomson atom. The Thomson atom is taken to receive the nucleus from the Bohr atom in the form of a "phantom nucleus" of exactly the same dimension. Through the action of the Reverse Higgs boson, the spherical metallic photon is then also taken to carry this phantom nucleus.

The Thomson atom is assumed to contain neither a Reverse Higgs boson remnant nor ghost states. When the Reverse Higgs boson acts on a massive fermion within the Thomson atom, the electron and its associated positron are taken to lose their mass and to be transferred onto an electromagnetic wave packet, thereby producing the spherical metallic photon.

An alternative pathway is also considered, in which energy supplied from the Thomson-atom shell drives the sequence shell photon energy → Higgs boson → highly massive positron → Reverse Higgs boson → massless positron in a high-energy protonic orbit. Within the author's framework, these two pathways represent distinct mechanisms by which the Thomson-atom state may be transformed through Higgs and Reverse Higgs processes. The author uses this construction to connect the nucleus with the gravitational

scheme. Gravity is taken to act between nuclei; accordingly, when massive fermions and gravity are considered together, protons and nuclei appear in the description. The manuscript connects this development to the Higgs and Reverse Higgs bosons and to the author's earlier treatments of Quantum Gravity, QTE, and Grand Unification [1,2,8].

If the test body at the field position is removed, the manuscript assumes that the space-time curvature remains, with a "phantom" test body representing whatever mass would otherwise determine F_{grav}.

In this role, the test body may be represented by photons or massive fermions e+ and e-, even though these are not treated as gravitational sources individually.

Similarly, the manuscript proposes that if the proton or nucleus at the source is removed, the gravitational-source property remains when the Bohr atom is transformed into a spherical metallic photon or Thomson atom. The source can therefore be represented by spherical metallic photons or massive fermions e^+ and e^- within a Thomson atom, but not by those particles individually. They must instead be enclosed by a membrane.

In the spherical metallic photon and Thomson-atom cases, the manuscript describes gravitation as proceeding through a hypothetical contraction of that membrane to nuclear dimensions, with the size of the phantom nucleus determined by the associated Bohr nucleus.

The spherical metallic photon is therefore described as a host of photons, one for each proton/electron, while the Thomson atom is described as a host of massive e^+/e^-, again one for each proton/electron of the associated Bohr atom. In both cases, everything is enclosed within a membrane, and it is this membrane that the author assigns the properties of a gravitational source. By analogy with the construction of the graviton in which a Bohr orbit is expanded in proportion to the separation between interacting nuclei and a pair of gravitons is placed on it the membrane of a spherical metallic photon is contracted to the size of the corresponding Bohr nucleus, after which a pair of gravitons is taken to propagate on it.

A membrane is therefore required from the outset; an individual electron, positron, or photon is not sufficient in the author's model. The membranes of spherical metallic photons and Thomson atoms are taken to originate from the nuclear membrane of the associated Bohr atom. As that membrane expands into one of the other lattice-point states, it progressively encompasses the externally orbiting fermions. The resulting external membrane is then treated as the defining structure for gravity. Its size is assumed to depend entirely on the number of protons in the Bohr atom, whether individually, in pairs, or as components of neutrons.

The author consequently attributes a role to the high-energy protonic orbit of the positron in facilitating membranes and therefore gravitation between groups of protons, while also assigning an individual proton its own "membrane," permitting it to act as a gravitational source, for example in a hydrogen atom.

To obtain a gravitational interaction at the field point, the manuscript expands a Bohr orbit from the nucleus in proportion to the interaction distance and then places a pair of gravitons on it. For the source, the construction is reversed: a "Bohr orbit" at the surface membrane of the spherical metallic photon / Thomson atom is collapsed inward to the location of the hypothetical "phantom nucleus," thereby defining the gravitational source. The two constructions are summarized as follows:

• Expand a circular Bohr orbit from the nucleus → collapse the circle into two parallel lines → install a graviton on each line → obtain gravitation at the field point.

• Begin with two parallel lines projecting outward from the membrane of the spherical metallic photon / Thomson atom, with a hypothetical graviton on each → shrink the membrane to the dimensions of the associated Bohr nucleus → obtain a phantom nucleus that facilitates a gravitational source.

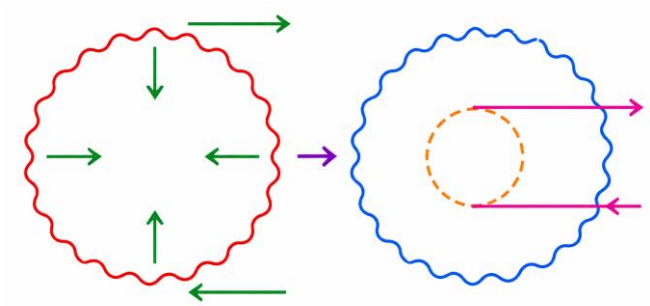

Figure 8. Author's schematic representation of the formation of a phantom nucleus in a spherical metallic photon or Thomson atom through inward contraction of the external membrane.

The manuscript treats this analogy as a complete account of Thomson atoms and spherical metallic photons within the proposed framework. The nucleus is identified as the source of gravitation, including cases in which it is represented by a "phantom nucleus" in Thomson atoms and spherical metallic photons. Fermions and photons that are not confined by a membrane associated with a Bohr/Schrödinger nuclear membrane are therefore not treated as gravitational sources. Gravity is consequently described as varying either (i) with the distance between the source and the field point, or (ii) with the dimensions of the nucleus or phantom nucleus at the source. To determine the interaction at the field point, the construction expands outward from the source nucleus; to determine the magnitude of the source, it contracts inward from the external membrane of the lattice point to the phantom nucleus.

Aether Gravitational Model: Liberty Krueger

The manuscript next discusses a LinkedIn post by Liberty Krueger, written in response to the author's question about whether Krueger's two "frequencies" might represent the properties of a dual-gravitonic interaction. Krueger's response rejected that interpretation but prompted the author to consider a different connection.

As quoted or paraphrased in the manuscript, Krueger describes the frequencies as being generated by the motions of each nucleus. These motions arise from a pressure force overcoming the inertial force of inward or outward motion. A compressed nucleus moving outward encounters a spherical barrier of higher pressure, which stops and deflects it inward. The inward motion then raises the pressure of the nucleus until that motion is stopped and reversed outward.

These alternating deflections produce a continuous pulsing motion and a pair of slightly different frequencies.
Their constructive interference is proposed to generate the barrier containing the nucleus and the surrounding structure of matter. In Krueger's formulation, this process requires no gravitons, only inward and outward pulsing motion and waveform interference between the generated frequencies.

A Gravitational Aether

Consider Figure 8 above. To obtain gravity from the Bohr atom in the author's model, with electromagnetic potential $V = 0$, we begin with a fixed number of waves around a nuclear orbit. The wave is expanded outward in the manner of the Bohr construction while retaining an integral number of wavelengths around the orbit. Once the orbit has been expanded to a sufficient spatial scale, the wave is collapsed into a "dual loop" around the two nuclei in question, with each side carrying the respective oppositely directed fermions.
Figure 8 represents the reverse construction. We begin with a dual loop connecting an interacting nucleus to the membrane of the spherical metallic photon/Thomson atom. For simplicity, the discussion hereafter refers to the spherical metallic photon. The dual loop is then "shrunk down" into the spherical metallic photon and its membrane, the reverse of the construction used to obtain the gravitational interaction in which graviton speed is taken to be proportional to interaction distance.
The same process may be viewed by starting with the expanded circular graviton pathway and compressing it inward. Eventually, the configuration shown on the right-hand side of Figure 8 is reached: a membrane surrounding the spherical metallic photon but no longer connected to an external loop. In the author's interpretation, inward compression acts against the aether. The aether driven toward the phantom nucleus is assumed not to penetrate that nucleus and therefore to be reflected outward. One pathway consequently contracts toward the phantom nucleus while the membrane remains fixed. At the same time, the second would-be nuclear connection expands outward but is constrained by the membrane. The intended final configuration is a dual gravitational loop between the two nuclei, rather than between the membrane of the spherical metallic photon and the interacting nucleus.

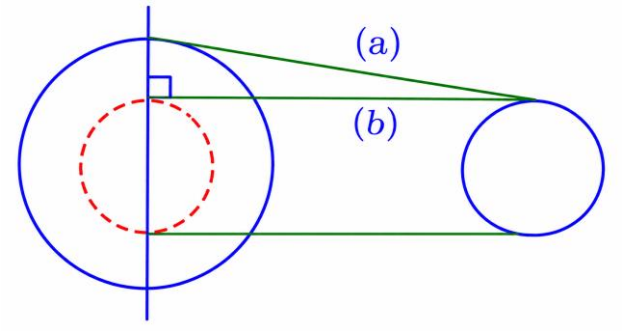

Figure 9. Proposed transformation from (a) a spherical-metallic-photon membrane–interacting-nucleus connection to (b) a phantom-nucleus–interacting-nucleus connection. The two paths are taken to contain the same number of wavelengths and to have the same propagation speed, but slightly different path lengths and therefore slightly different frequencies.
This provides the pulsing mechanism that the manuscript associates with Krueger's description. Two deflections are involved: (i) the incoming membrane-graviton pathway drives the aether toward the surface of the phantom nucleus, and (ii) the expanding prospective nucleus-to-nucleus pathway drives the aether toward the inner surface of the spherical metallic photon membrane. In the author's model, these opposing deflections produce a continuous pulsing motion and a pair of slightly different frequencies.
The process is then assumed to return to the spherical metallic photon together with the interacting nucleus, but with the dual gravitational loop now connecting the interacting nucleus to the phantom nucleus rather than to the external membrane. During this transformation, the manuscript identifies the "pulsation" described by Krueger. Because the spherical metallic photon is constructed from Bohr orbits containing integral numbers of wavelengths, the author assumes that the membrane-to-interacting-nucleus path and the phantom-nucleus-to-interacting-nucleus path contain the same number of wavelengths. Since the center of the phantom nucleus coincides with the center of the spherical metallic photon, the two waves are taken to propagate at the same speed. Their slightly different path lengths therefore produce slightly different frequencies. The manuscript presents this as a possible correspondence with Krueger's two-frequency description.

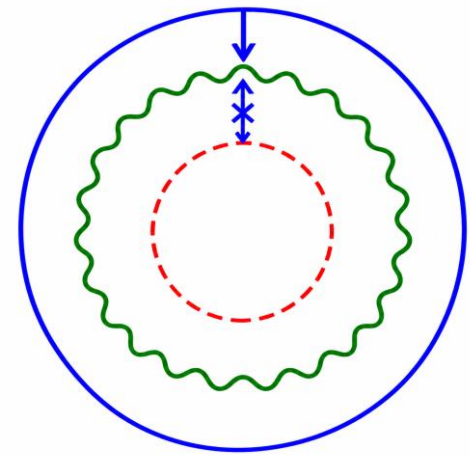

Figure 10. Alternative representation of the Figure 8 construction, incorporating the Krueger pulsing condition proposed in the manuscript.

DISCUSSION

Symmetry of the Four States of Matter

The manuscript interprets the Krueger and Farmer descriptions as agreeing that the nucleus is central to gravity. Because the proposed gravitational propagation speeds are variable, the author considers an aether description applicable, whereas the electro-grav/General Relativity case is treated differently because $v = c$ is constant.

The Krueger–Farmer correspondence is then examined through the proposed gravitational behavior of spherical metallic photons and Thomson atoms, which are described as lacking ordinary nuclei. The manuscript next seeks a symmetry among four states of matter: the Schrödinger atom, spherical metallic photon, Bohr atom, and Thomson atom.

- Two of the four states have a nucleus and two do not: Schrödinger atom ↔ spherical metallic photon; Bohr atom ↔ Thomson atom.
- Three states are located in the metal lattice; the Schrödinger atom is the exception.
- Three states are called atoms; the spherical metallic photon is the exception.
- Three states are defined by a circular shell at the extremity; the Schrödinger atom is the exception.

In this classification, the spherical metallic photon is initially the "odd one out" as the only state not called an atom. The manuscript then reclassifies the four states into two photonic states (Schrödinger atom and spherical metallic photon) and two fermionic states (Bohr atom and Thomson atom). In the author's terminology, the Schrödinger atom is described as "walking light," corresponding to the proposed transition of Bohr atoms out of the lattice and into the Schrödinger state, as discussed in Grand Unification [1].
The manuscript further assigns a factor of two to the Bohr and Thomson states because both the orbital electrons and the proton / proton remnant are treated as massive. In contrast, the Schrödinger-atom / spherical-metallic-photon pair is described as containing "one of each," with one proton represented in massive form and one in massless form.

Einstein's "Hidden Variable": me → ψ

The manuscript next compares Bohr and Schrödinger descriptions. If the kinetic-energy coefficient in the Schrödinger equation is written with $m = m_e$ and the potential is chosen as $V(Z = 1)$, the author states that the Bohr atom and Bohr spectrum are recovered from a Schrödinger analysis. Standard historical background on the Bohr and Schrödinger formulations is provided in [5,7,13]. The manuscript writes this correspondence schematically as:

$$-\frac{\hbar^2}{2m} = -\frac{\hbar^2}{2m_e}, \quad V = V(Z = 1) \rightarrow \text{Bohr hydrogen atom} \tag{25}$$

The manuscript then asks whether the same procedure could be applied to helium and higher-Z atoms:

$$-\frac{\hbar^2}{2m} = -\frac{\hbar^2}{2m_e}, \quad V = V(Z = 2) \rightarrow \text{Bohr helium atom} \tag{26}$$

The proposed answer is no, because the condition $m = cte. = m_e$ is connected in the manuscript with orthogonality. Setting $m = m_e$ in the Schrödinger treatment is said not to enforce orthogonality between electron orbits.

The electron states are therefore taken to interfere with one another and to contribute to V. Hydrogen is treated as the special case because only one electron is present. Consequently, the manuscript proposes that a Bohr helium atom, and analogous higher-electron Bohr atoms, cannot be obtained directly from the Schrödinger equation under this restriction because the corresponding Bohr orbits are not orthogonal. Within this framework, the failure of orthogonality is expressed as:

$$\int \psi_1^* \psi_2 \, d\tau \neq 0 \tag{27}$$

and, in the manuscript's restricted integration domain, as:

$$\int \psi_1^* \psi_1 \, d\tau \neq 1 \tag{28}$$

The author explains the second expression by arguing that the relevant integral is not taken from zero to infinity, but from R to infinity, where R is the radius of the innermost electron orbit in helium. In this interpretation, the integration domain is therefore not all space. The manuscript relates this construction to the Bohr quantization condition [13]:

$$mvr = n\hbar \tag{29}$$

For a multi-electron atom, the author proposes that the expansion for an outer orbit begins not at zero but just outside the innermost electron orbit, so that the effective nuclear charge has been reduced by one.

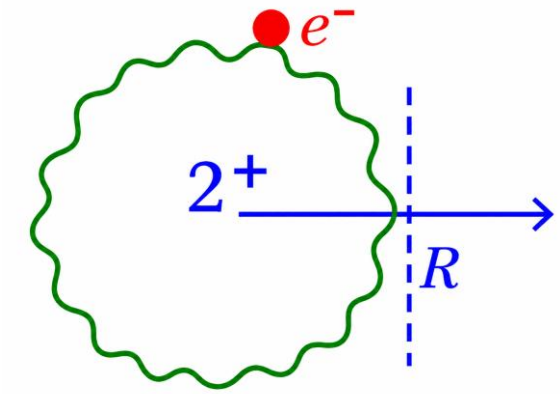

Figure 11. For a second electron in the proposed multi-electron Bohr construction, the integration is begun just outside the first electronic orbit at radius R and is then extended outward, rather than beginning at the nuclear center. The manuscript therefore concludes that the only Bohr orbit obtainable directly from the Schrödinger analysis under $m = m_e$ is the hydrogen orbit. Because hydrogen contains only one electron, orbital orthogonality does not arise as an inter-electron constraint in that case.

Non-Orthogonality of Bohr Orbits

Consider again the Bohr quantization condition in Equation (29). In the manuscript's interpretation, n gives the number of wavelengths around a given orbit but is not itself identified with how far the orbit has been expanded. Classical mechanics nevertheless yields a sequence of fixed orbital radii that increase with n. The author therefore proposes that the overlap

between two Bohr-orbit wavefunctions is evaluated over the spatial interval separating the lower and upper orbits, beginning just outside the electron that defines the inner boundary of the outer orbit. If, hypothetically, the overlap integral for two Bohr orbits could be taken from zero to infinity, the manuscript states that one would expect:

$$\int_0^\infty \psi_1^* \psi_2 \, d\tau = 0 \tag{30}$$

The manuscript argues that the overlap decreases as the spatial separation between two Bohr orbits increases. For two low-lying orbits that are close in radius, the integration interval is relatively small and the overlap is taken to be comparatively large. Moving the higher-energy electron to a more distant orbit increases the integration interval and reduces the overlap. Orthogonality is therefore described as being approached only for very large orbital separations, rather than being imposed exactly between nearby Bohr orbits. For Schrödinger orbitals, by contrast, the manuscript treats both wavefunctions as being defined from the nuclear center rather than defining the outer orbital only outside the inner one. The author therefore distinguishes the integration domains used in the Bohr and Schrödinger constructions. In the notation of the manuscript, the proposed equivalences are summarized as:

$$\int_0^{R_2}(\text{Schrödinger}) \sim \int_R^\infty(\text{Bohr}) \tag{31}$$

$$\int_R^\infty(\text{Bohr}) \sim \int_0^\infty(\text{Bohr}) \tag{32}$$

The manuscript further represents the change of integration domain as:

$$\int_0^\infty(\text{Bohr}) \;\rightarrow\; \int_R^\infty(\text{Bohr}) \tag{33}$$

Normalization is expressed in the usual form:

$$\int \psi^* \psi \, d\tau = 1 \tag{34}$$

and, for the two proposed Bohr-orbit domains, as:

$$\int_0^{R_2} \psi_1^* \psi_1 \, d\tau = 1 \tag{35}$$

$$\int_R^{R_2} \psi_2^* \psi_2 \, d\tau = 1 \tag{36}$$

These equations preserve the author's proposed integration scheme. Standard quantum-mechanical orthogonality and normalization are governed by the Hilbert-space structure of the states; the cited historical sources [5,6] provide background for the conventional formulation, while the manuscript's restricted-domain construction is the author's own proposal.

The Uncertainty Principle

The manuscript finally considers a graviton connecting a source and a field point. The transport time Δt is assumed to be constant and the interaction distance is $\Delta x = R$. The graviton is described as being accelerated from rest onto a gravitational flux tube: initially $v = 0$ and $m = m_e$; following the naked Reverse Higgs process, $m = m_e$ is retained, and the speed is then extended from $v = c$ to $v = \alpha R$. The entire process is related by the author to the special-relativistic mass expression introduced earlier. The initial momentum and energy are taken to vanish because $v = 0$, so the graviton momentum and energy are interpreted as changes Δp and ΔE. For non-trivial interaction distances, the manuscript assumes:

$$m \propto \frac{1}{R}, \qquad v \propto R \tag{37}$$

Consequently, $p = mv$ is taken to be independent of R, as is Δt, whereas the kinetic-energy scale $E = mv^2$ is taken to be proportional to R. The manuscript then compares these scalings with the standard position-momentum and energy-time uncertainty relations. For the historical and mathematical background of uncertainty relations, see Heisenberg [14], Kennard [15], and Robertson [16].

$$\Delta x \, \Delta p \gtrsim \frac{\hbar}{2} \tag{38}$$

$$\Delta E \, \Delta t \gtrsim \frac{\hbar}{2} \tag{39}$$

The author interprets Δp and Δt as invariant with R, while Δx and ΔE are both proportional to R, and therefore argues that the two-uncertainty relations scale consistently within the proposed graviton model. The manuscript next considers two protons in contact, with center-to-center separation $2R_{proton}$. At this limiting separation, the author assigns $v = c$ and thereafter takes the graviton speed to increase in proportion to R. The graviton mass is represented as:

$$m = \frac{m_{0/c}}{\sqrt{1-v^2/c^2}} \;\rightarrow\; \frac{m_{c\text{-mass}}}{\sqrt{1-v^2/c^2}} \tag{40}$$

The manuscript identifies the limit from below with me and the limit from above with the "c-mass." As v increases above c, the author describes m as evolving from the limiting 0/0 form at $v = c$ to the graviton mass. For sufficiently large R, the constant term 1 in the denominator is neglected, yielding the approximate scaling $v \propto R$ and $m \propto 1/R$.

For smaller separations, where v is not much greater than c, the author proposes that retaining the 1 term may account for the "acid theory" introduced in the author's Quantum Gravity discussion [8]. The manuscript summarizes the subluminal and superluminal branches as follows. For $v \leq c$, the naked Reverse Higgs and energy-input expressions are written as:

$$m = \frac{m_0}{\sqrt{1-v^2/c^2}} = m_e, \; E = m_e c^2 + \frac{1}{2} m_e v^2 \tag{41}$$

For $v \geq c$, the corresponding expressions are written as:

$$\frac{m_c}{\sqrt{1-v^2/c^2}} = m_{c\text{-mass}} \;, \quad mv^2 \propto v \propto R \tag{42}$$

with the energy input again taken as $(1/2)mv^2$. As v approaches c from above or below, the manuscript states that $m_c/m_0 \rightarrow 0$. In the gravitational branch, the author further argues that mc differs from the c-mass only to the extent that neglecting the constant 1 in the square-root denominator ceases to be a good approximation. This is then related to Krueger's two closely spaced frequencies through $E = h\nu$. The two associated energy scales are represented as:

$$E_1 = m_c c^2, \quad E_2 = m_{c\text{-mass}} c^2 \tag{43}$$

The manuscript therefore adopts the approximation $m_c \approx c$-mass and presents this as completing the proposed Krueger–Farmer gravitational-aether model.

CONCLUSION

This study has developed the Krueger–Farmer gravitational-aether model by bringing together the proposed Higgs and Reverse Higgs processes, the gravitational behavior of metallic-lattice states, the concept of a phantom nucleus, and the two-frequency description of gravitational interaction. Within the framework presented here, the nucleus is identified as the fundamental source of gravitation, while spherical metallic photons and Thomson atoms are assigned phantom nuclei derived from the nuclear membrane of the corresponding Bohr state.

This construction allows the three proposed metallic-lattice states to be treated within a common gravitational scheme. The model further provides a possible correspondence between Krueger's gravitational-aether description and the present graviton-based formulation. The inward and outward transformations between the external membrane and the phantom nucleus produce two gravitational pathways having the same number of wavelengths and propagation speed but slightly different path lengths. These differences generate two closely spaced frequencies and provide the proposed physical basis for the pulsing gravitational-aether mechanism considered in this work.

The analysis also extends the framework to the relationship between Bohr and Schrödinger descriptions of atomic states. In particular, the proposed restricted integration domains of multi-electron Bohr orbits lead to non-orthogonality between neighboring orbital states, while the hydrogen atom remains the special single-electron case directly recoverable under the condition $m = m_e$. Finally, the assumed graviton relations $m \propto 1/R$ and $v \propto R$ give a distance-independent momentum while the associated energy scale varies with interaction distance. Within the assumptions of the present model, these relations are shown to scale consistently with the position–momentum and energy–time uncertainty relations.

Taken together, these results provide a unified formulation of the proposed Krueger–Farmer gravitational aether in which nuclear structure, phantom nuclei, Higgs/Reverse Higgs transformations, gravitational propagation, and quantum-mechanical relations are incorporated within a single theoretical framework. The model remains a theoretical proposal, and its physical implications and distinguishing predictions require further analytical development and experimental assessment.

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