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Redefining the Electron with Regard to Augmented Newtonian Dynamics

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Abstract:
This paper presents a novel model of the electron according to Augmented Newtonian Dynamics, extending Newtonian dynamics into the sub-atomic level. The paper challenges the conventional understanding of quantum mechanics, particularly the wave-particle duality and the resulting wave-function paradigm. It begins by critiquing the historical adoption of duality to resolve issues like the radiative instability of electrons in atomic orbits, as highlighted by the Larmor formula. The author contends that while duality helped stabilize atomic models, experimental evidence—such as the Lamb shift—indicates that the electron can be more accurately described without invoking wave-particle duality. The proposed model describes the electron as a stable, solid particle that regulates its energy around the nucleus by continually emitting and absorbing virtual photons and in this way self- regulating its energy and preventing it from falling into the nucleus through a dissipation of its energy through radiation. The paper introduces the concept of zero energy in a nuanced and regulated manner showing that it occupies the whole of the Universe. This network, termed the virtual photon field or dark matter (aether), permeates all of space and plays a fundamental role in electromagnetic radiation and gravity.

Keywords: Augmented Newtonian Dynamics**,** Gravity, photons, wave-function, aether, Dark Matter, Light, CMBR, electrons

Introduction to Augmented Newtonian Dynamics

This paper presents a novel model of the electron according to Augmented Newtonian Dynamics, extending Newtonian dynamics into the sub-atomic level. Augmented Newtonian Dynamics (AND) posits two foundational principles. The first is that unlike the Standard Model Theory which treats photons as fluctuations or excitations of the field, (AND) proposes that photons have their genesis in electrons and not in fields. According to the Standard Model, photons have their genesis in fields. By contrast Augmented Newtonian Dynamics (AND) states that photons are formed within the electron through emission of pulses of electric energy that achieve a stable dipole configuration that we perceive as photons. The second posit made by Augmented Newtonian Dynamics (AND) is that an aether or medium exists, consisting of a virtual photon aether that permeates the entire Universe. The reasoning is as follows, during the Big Bang, as matter was created, photons were emitted in vast quantities, at rates of around 10^{14} Hz. per particle of ordinary matter. Although this early light would not have been visible due to the prevailing extreme heat and plasma conditions, it's widely accepted that photons were produced alongside every particle of matter, contributing to an immense number of photons in a process that persisted for hundreds of thousands of years.

These photons could not escape the Universe, so they filled it, expanding as the Universe itself grew. According to Augmented Newtonian Dynamics, the structure of these early photons allowed them to link together, forming a background fabric that permeated the Universe, including all matter. As the Universe expanded further, the energy of these photons diminished, ultimately resulting in an individual energy level around 10^{-51} J, transitioning them into virtual photons.

Due to the Heisenberg Uncertainty Principle (HUP), these virtual photons could exist indefinitely. With energy at 10^{-51} J and Planck's constant h = 6.63 x 10^{-34}, calculations suggest these virtual photons could persist for approximately 21 billion years, as events occurring in extremely short times or with negligible energies can bypass the constraints of energy conservation.

$$\Delta T \Delta E =\leq h \therefore T = \frac{h}{E} = \frac{6.632\times10^{-34}}{10^{-51}} = 6.632 \times 10^{17}\text{s} = 2.1 \text{ x } 10^{10} \text{ years} \quad (1)$$

Empirical proof is present that such an aether type medium exists in the form of the Lamb Shift experiment and in the phenomenon of virtual interactions that hold the nucleus together.

The Lamb shift and virtual particles

In 1947, physicists Willis Eugene Lamb and Retherford studied hydrogen atom energy levels under microwave frequencies and discovered the Lamb shift—a surprising energy difference. This shift is due to interactions between virtual photons from vacuum fluctuations and the bound electron in the atom. Their findings confirmed the existence of virtual particles and strengthened quantum electrodynamics (QED) as a foundational theory in quantum physics. Julius Schwinger, Richard Feynman, Sin-Itiro Tomonaga, and Hans Bethe all played crucial roles in the development and formalization of quantum field theory (QFT) and the concept of virtual particles.

Wave-particle duality was adopted to explain the apparent stability of atoms, which classical physics couldn't at the time resolve. Electrons in orbit around a nucleus should, due to their acceleration, continuously emit radiation and lose energy, causing them to spiral inward into the nucleus. The introduction of wave-particle duality—where electrons exhibit both particle and wave-like properties—provided a theoretical framework, albeit a shaky one, where the electron could "resist" collapse, as the wave aspect allowed stable orbits without energy loss from continuous radiation, thus apparently resolving the issue of atomic stability.

A closer inspection of the Quantum mechanics' explanation of the Lamb Shift and its interaction with virtual particles suggests a need for reinterpretation, particularly regarding how electrons interact with virtual particles. At present these self-interactions that take place between the vacuum and the electron in the form of absorbing and emitting virtual photons are meaningless, they serve no purpose, aside from indicating that space is not empty but filled with an anomalous underlying energy. Photons are considered by quantum mechanics to be fluctuations of the quantum field, and the vacuum is filled with energy from which particles can spontaneously emerge. This implies the presence of an underlying energy that exists throughout the universe. According to the Augmented Newtonian Dynamics (AND) hypotheses, the electrons' interaction with the vacuum energy is not random but serves the extremely important function of stabilising the electron in its orbit around the nucleus. When an electron emits and absorbs virtual photons, these interactions span atomic regions, from the nucleus to the valence shell (i.e., from the p shell to the s shell). One possibility is that these interactions stabilize the electron's orbit, ensuring it absorbs and emits the energy needed to stabilize itself. This is a more structured approach than the QM approach that the electron is experiencing random fluctuations. This process prevents the electron from spiraling into the nucleus. This is in keeping with the mechanism that holds the nucleus together via exchange of

gluons, an interaction that is also virtual. So, while gluons themselves are real force carriers, the gluon exchange in QCD interactions typically involves virtual gluons, just like the exchange of virtual photons in electromagnetic interactions. The existence of virtual gluons in Quantum Chromodynamics (QCD) is a well-established concept in modern particle physics. This information can be found in authoritative textbooks and research papers on quantum field theory and QCD. [1] (Peskin, M. E., & Schroeder, D. V. (1995). "An Introduction to Quantum Field Theory.")

The electron self-regulates its energy remaining in a stable orbit around the nucleus.

The staggering implications of the conclusion that electrons are undergoing constant self-interactions with virtual photons, is that the whole notion of wave particle duality is false. Wave-particle duality is no longer needed to explain the question of how the electron maintains its stability within the atom: which is the primary reason that wave-particle duality had been introduced. By constantly emitting and immediately re-absorbing virtual 'photons' as it orbits the nucleus, the electron is in effect self-stabilizing its energy and the possibility of its spiraling into the nucleus no longer arises. It is postulated by (AND) that these self-interactions between the electron and the vacuum energy might involve the emission and absorption of real photons with real energies but in an interaction that takes place over such a short period of time (10^{-18} s) that the interaction is virtual and the conservation laws are circumvented. This explanation for the stability of the electron around the nucleus not only does away with wave particle duality but also brings the question of electron stability around the nucleus into keeping with classical physics. This explanation for the stability of the electron around the nucleus is similar to the manner in which the stability of the nucleus is maintained through the exchange of virtual particles such as gluons without resorting to wave-particle duality.

If the explanation put forward by Augmented Newtonian Dynamics for the electron's stability around the nucleus is to be acknowledged, it follows that the emission and absorption of virtual photons by the electron as it orbits the nucleus will have to have a definite, though immeasurable, energy: in the same way that gluons convey binding energy in in the nucleus. The Lamb shift discovery was crucial in transitioning virtual particles from theoretical constructs to accepted components of quantum field interactions.

The actual physical verification of the existence of virtual interactions and virtual particles, justifies, the Augmented Newtonian Dynamics concept of a universal virtual photon aether comprised of very low energy virtual photons each with an energy of only 10^{-51} J that were formed at the time of the Big Bang and that permeate every part of the Universe, including all matter and the vacuum. This universal virtual photon field forms the background fabric of the Universe. It is with these virtual photons of the Universal photon field that electrons interact with to propagate light.

Augmented Newtonian Dynamics (AND) on photons

The present exploration of photon structure under Augmented Newtonian Dynamics (AND) provides a fresh perspective on the nature of photons, diverging significantly from the established quantum mechanical framework. A key focus is the critique of the current understanding of photons, particularly highlighting the unresolved question of their origin within mainstream theory. The discussion transitions towards proposing a structured model of the photon, analogous to the structural discovery of DNA by Crick and Watson, with the aim of uncovering the physical basis of the photon's properties. This approach

distinguishes itself by shifting away from abstract theorization and moving toward the elucidation of empirical observations.

Electron Energy Invariance Equation:

(2)

$$E_0 + \sum_{i=1}^{\infty} (E_{\text{photon}} - E_{\text{emission}}) = E_0$$

This equation indicates that an electron's energy remains constant over time taking into account emission and absorption events.

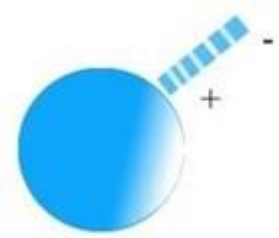
Photon emission and absorption:

The electron possesses a charge and energy of approximately
(1.6 x 10^{-19} C.) and an energy of (1.6 x 10^-19 J) (3)

$E_e = q_e = 1.6 \times 10^{-19}$ J

When the electron emits pulses of electrical energy, these pulses are very brief, lasting about 10^{-18} seconds. Let the energy pulse be represented as (E_p), emitted over a very short time (Δt) (approximately (10^{-18} s). Instead of propagating, the pulses of electric energy are momentarily static, existing in space.

E_p (static) → dipole formation



Pulses of electrical energy emitted from electron are polarised

Figure 1. A Photon consists of pulses of electric energy separated by a di-electric,

These static energy pulses, with initial pulses of energy being stronger than subsequent pulses of energy induce a separation of charge around them, resulting in the formation of a dipole—a configuration with a positive and a negative charge. The dipole moment (p) is given by:

$p = q \cdot d$ (4)

Where:

q = charge separation

d = distance between charges

This dipole configuration stabilizes around the emitted energy pulses, leading to the creation of a coherent structure that we recognize as a photon:

$E_{photon} = hf$ (5)

In this framework, the energy associated with the electron facilitates the emission of static electric energy pulses that create a dipole, resulting in a stable photon configuration.

Solenoidal field takes shape around pulses of energy forming a photon

Figure 2

This illustrates that the energy of the emitted photon possess a high flexibility Allowing for the electron to produce an almost infinite variety of photons as the need arises. This flexibility is what gives this process a high utility in explaining electron/photon interactions. The electron transitions between energy states by absorbing or emitting photons, which have energies defined by the equation ($E_{photon} = hf$). Further the rate of emission and absorption is high: $f = 10^{14}$ approx. (note: Lower energy photons such as radio waves are not emitted directly by the bound electron). Where:

(h) is Planck's constant (6.63×10^{-34} J).

(f) is the frequency of the photon.

Photon absorption process:

$E_{electron} + E_{photon} \rightarrow E^*$ excited state (6)

Photon emission process:

$E^* \rightarrow E_{electron} + E_{photon}$ lower energy state (7)

This process of photon absorption and emission by the electron demonstrates the rapid rate of oscillation of the electron within the atom. The working of the newly discovered rubidium atomic clocks confirms this rapid oscillation of the electron within the atom. In these clocks, the oscillations of the electron in the excited state are what enable the highly precise measurement of time. These high-frequency oscillations (at the level of hundreds of terahertz, or trillions of cycles per second) are typically in the ultraviolet or visible light range. The concept of "photon resonance" in this context refers to the process where the emitted photons are at a frequency corresponding to the transition between energy states of the electron in the atom, and this is used to synchronize and measure time. [2] **Hinkley, N., et al.** (2013). ("An optical lattice clock with accuracy and stability at the 10^{-18} level." *Science*, 341(6151), 1215–1220. doi:10.1126/science.1237867.)

Photon emission and absorption process:

Augmented Newtonian Dynamics explains sub-atomic processes involving the emission and absorption of photons within the atom as follows. The theories adopted by the Standard Model of quantum mechanics, with its heavy dependence on wave-particle duality, wave-functions and probability amplitudes is dismissed and the electron is treated instead, as a solid particle orbiting the nucleus. As had been illustrated earlier it is thought that the electron oscillates at a very high rate and emits and absorbs photons at the rate of several hundreds of trillions of photons per second.

In doing this the electron follows the laws of classical physics as applied to recoil processes where $\Theta_{incidence} = \Theta_{recoil}$. Absorption and emission processes continue for as long as excitation of the electron within the atom takes place. Take for example excitation of the bound electron by artificial light or by sunlight, electrons are excited and are oscillating at the rate of hundreds of trillions of times per second, for very

long periods of time. According to Augmented Newtonian Dynamics, this phenomenal rate of absorption and emission by the bound electron is possible because the electron and the proton, possess equal and opposite charge so that when they make contact, they neutralise each other. This makes it possible for an excited electron to physically recoil off the nucleus. Examining a single interaction of an electron with an incoming photon, this is what takes place. A radiating source emits a photon, note that the size of the photon with a diameter of 10^{-16} m, (length of photon is variable and depends on energy content of photon being emitted) makes it possible for a specific electron in a specific atom to easily absorb and emit incoming photons of specific energies and frequencies, the emitted photon is absorbed by an electron with the proper energy level within the atom.

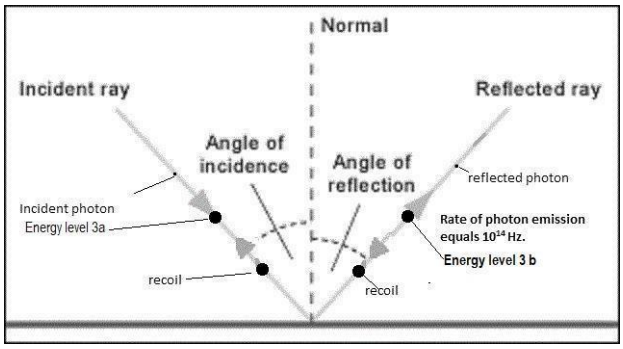


Figure 3 (Process of emission and absorption of photons by electron following classical laws of reflection.)

The absorption of the photon imparts momentum to the electron propelling it in the direction of the nucleus. Since the size of a proton (nucleus) is approximately 2000 times the size of the electron, the nucleus appears to the electron to be a perfectly flat, perfectly smooth surface. Instead of smashing into the nucleus, as the electron approaches the nucleus, the equal and opposite charges possessed by the electron and proton are temporarily neutralised. It should be remembered that the atom is neutral because overall, the charge of electrons to protons is equal. Any extra interaction that takes place can therefore be treated as an individual interaction between electron and proton.

Instead of being repelled, the electron momentarily neutralizes with the nucleus's positive charge; as long as conditions prevail where a potential difference is absent, charges neutralise. This phenomenon is particularly important in contexts like **atomic physics**, and **screening effects** in plasmas or other many-body systems, where the electron's interaction with the nucleus leads to a brief **neutralization** or partial cancellation of charge, but the electron remains negatively charged overall. [3] (Griffiths, David J. (2017). "Introduction to Electrodynamics" (4th Edition)). This leaves the electron at the point of interaction with the nucleus with the energy and momentum imparted by the incoming photon. The electron then recoils off the nucleus, following classical laws of reflection (where angle of incidence equals angle of recoil). When the electron reaches the energy level corresponding to the energy level where the photon was initially absorbed but at the opposite position, it emits a photon of the same energy as the absorbed photon, in order to cope with the forces of recoil resulting from the emission of a photon it retraces its path and ends up in its original position at n = 3, where it absorbs another photon and the whole process repeats. This process takes place at the rate of hundreds of trillions of repetitions of absorptions and emissions every second and continues for as long as the excitation from that particular source continues. If the energy

of the emitted radiation from the source continues and the direction remains unchanged, rays of connected photons are created that travel in straight lines. This process explains the rectilinear nature of light.
The sequence repeats, with the electron experiencing gain in momentum from emission of photon at new position in $n = 3$ and undergoing recoil taking it back to its original position at $n = 3$ and the whole sequence repeats at the rate of hundreds of trillions of repetitions per second.

Figure 4. Structure of both 'real' and 'virtual' photons.

The process of photon absorption and emission by the bound electron may be described on a step by step basis as follows:-

Electron in Stable State: An electron occupies a specific energy level within an atom, maintained by its energy, mass, momentum, etc.

Photon Absorption: The electron is irradiated by an external source, absorbing incoming photons of an acceptable energy level at the rate of hundreds of trillions of photons per second.

One at a Time: The electron processes the incoming photons singly one at a time over a very short time scale on the order of 10^-18 s for each interaction.

Energy Absorption: When the electron absorbs an incoming photon, it results in a net gain in energy.

Recoil Towards Nucleus: To conserve energy and momentum, the electron is propelled towards the nucleus due to the recoil from the energy gain.

Neutralization at Nucleus: Upon reaching the nucleus, the electron's negative charge is temporarily neutralized by the proton's positive charge, achieving a neutral state.

Rebound Mechanism: Despite the temporary neutralization, the electron still retains the extra energy imparted by the absorbed photon. It rebounds off the nucleus according to the laws of classical physics, where the angle of incidence equals the angle of reflection.

Energy Emission: Upon reaching the higher energy level, the electron emits the extra energy gained by the absorption of the photon, returning to its original energy level of 1.6×10^{-19} J.

Recoil and Return Path: The emission process causes the electron to recoil, following the path it took to its original position.

Repetition: The electron continues to absorb incoming photons, repeating the cycle of propulsion towards the nucleus, neutralization, rebound, emission, and recoil, all according to the classical laws of reflection , where:

$$\angle i = \angle r \quad (8)$$

Incorporating these new concepts into the framework of Augmented Newtonian Dynamics emphasizes the conservation of the electron‘s original energy level during the emission and absorption process. This approach offers a classical perspective that seeks to integrate concepts of energy absorption, emission, and momentum of conservation in a coherent framework. At the same time, it also explains in a clear, easily understood manner, how electrons can be emitted and absorbed at the phenomenal rate of hundreds of trillions of photons every second, which is what is needed to explain this phenomenon in the modern context. The terse quantum mechanics one-off description of photon emission and absorption is no longer adequate. If one considers that modern smart phones are capable of processing data at the rate of GHz per second, it follows that at the miniscule scale of the atom, electron oscillations at the rate of hundreds of trillions of Hz are not only possible but probable, and in fact this has conclusively been proven to be the case. [2]

This description of photon emission and absorption processes by the bound electron, with its classical connotations provides an intuitive understanding that complements the quantum mechanical framework, offering a broader perspective on the behaviour of electrons within an atom. This is the new ontology of the electron within the atom. The proposed model emphasizes the emission and absorption of photons by electrons at a very high rate, occurring at rates of hundreds of trillions per second, and re- establishes a classical view of particle interactions, which accounts for the observed rectilinear propagation of light and the phenomenon of shadow formation.

Dipole Stability and Propagation

The model‘s explanation of photon propagation, relying on the dipole structure of linked electric pulses, offers a clear alternative to the wave-like behaviour of the wave-function described in quantum mechanics. By postulating that photons interact and link with adjacent photons during their journey, the theory provides a tangible mechanism for energy transfer, and an explanation for how photons are able to retain their energy intact over huge distances. This mechanism upholds classical principles of light behaviour, such as the inverse square law, and the rectilinear propagation of light while presenting a cohesive model for photon propagation. The structured, stable photon model allows for a more intuitive explanation of light‘s dual behaviour as both a particle and a wave, grounded in classical physics. The dismissal of the traditional electromagnetic field in favour of a virtual photon field represents a significant departure from existing theories, underscoring the novelty of Augmented Newtonian Dynamics (AND's) conceptual framework.

Virtual Photon Field and Energy Exchange

The introduction of a virtual photon field to replace the electric and magnetic fields provides a new way of understanding the role of photons in mediating electromagnetic interactions. This concept posits that photons, despite their massless nature, can carry energy across immense distances by interacting with this field, ensuring energy conservation. The virtual photon field thus becomes the medium through which light propagates, functioning as the basis for both light transmission and force mediation in electromagnetism. The virtual photon field replaces all of the multiplicity of fields required by the Standard model with a single all pervasive field.

The Cosmic Microwave Background Radiation

Ever since the discovery by Penzias and Wilson of what was claimed to be the Cosmic Microwave Background Radiation (CMBR) in 1964, it has been viewed as relic radiation from the Big Bang. However, this assumption faces several challenges. For instance, the persistence of the CMBR contradicts established scientific ontology and ignores signals generated by the present universe. If the non-relativistic Doppler shift is used to calculate the red-shift, it shows that the CMBR must have been moving away from the source at twice the speed of light. If this had been true it would have been impossible to see the red-shift as this light would have never reached us. The same argument can be used for exponents of Dark Energy who claim that the Universe is expanding away from us at faster than light speeds, if this were true we would have no inkling of such an event taking place, since light from such an event would never reach us. The explanation that it is space that is expanding without affecting local events is based on an esoteric paradigm.

Most of the universe's matter is hydrogen (about 75%), and the CMBR's 1 mm wavelength aligns with hydrogen's spectrum. It's unlikely that massive hydrogen clouds, where galaxies are born, are entirely quiescent. If the CMBR isn't relic radiation, what is it? It may instead represent current radiation from the universe, while the true relic radiation from the Big Bang could be dark matter, which possesses characteristics like extremely low energy (10^{-51} J) and minimal interaction with matter. It might be argued that the CMBR has a distinct Black Body radiation, but it should be remembered that radiation from the sun also closely approximates black body radiation.

Dark Matter as the new Aether

The explosion of the atomic bomb in 1946 triggered a paradigm shift among physicists, elevating Einstein's theories to near-sacred status while rendering the concept of an aether abhorrent. This aversion to aether has led to skepticism and ridicule towards its mention, despite its historical significance and the contributions of great minds to the concept. Similar to the futile search for the aether, efforts to understand dark matter have also yielded null results. Remarkably, dark matter allows electromagnetic radiation—including x-rays and light—to propagate freely, just as the aether was theorized to do. Claims of discovering dark matter's distribution echo the absurdity of the luminiferous aether theory, as electromagnetic waves travel uniformly across the sky, suggesting a uniform distribution of dark matter.

Dark matter interacts minimally with matter, it is estimated to pass through a lead block a light year thick without obstruction or interaction and vice-versa. The only noticeable effect of Dark Matter is gravitational influence. This paper posits that the universe is permeated by virtual photons, each with an energy of 10^{-51} J, formed during the Big Bang. These virtual photons, akin to real photons but with significantly lower energy, serve as infinitesimal electric dipole points that permeate the entire universe, thereby emulating the concept of a classical field wherein every point in space is occupied. This concept serves as an accurate analog of Dark Matter.

The propagation of light according to Augmented Newtonian Dynamics:

When an electron within an atom that is orbiting the nucleus (note the new terminology) is excited and emits a photon, the photons of the virtual photon aether (Dark Matter if you like) form into a line whose ends rest on the shoulders of infinity and the energy of the real photon travels along this line of aligned virtual photons. Note that it is the energy of the real photon that travels and not the photon itself. This brings the propagation of light into line with the way in which all waves travel. Since photons are emitted

by electrons at a very high rate (10^{14} Hz) each line of aligned virtual photons consists of huge numbers of identical photons all possessing identical energies, wave-lengths and frequencies and all travelling in an interconnected formation in a straight line. This transforms the line of aligned virtual photons into a ray of monochromatic light. As the lead photon in this ray of photons comes into contact with a virtual photon of the virtual photon aether, it promotes that virtual photon into a real photon by passing on all of its energy to the virtual photon it is in contact with. The energy of the lead photon is immediately replenished by the line of real photons behind it. In the meantime, the virtual photon that has been promoted to a real photon also passes on all of its energy to virtual photons that it comes into contact with and its energy is similarly replenished from the line of real photons. This is how light spreads out in keeping with the inverse square law. Therefore, all of the photons on the wave front that is built up in this manner possess identical energies frequencies and wavelengths, although the intensity (fewer photons in line behind the lead photons on the wave-front) will be diminished. This transfer of energy from real photon to virtual photon is lossless as it occurs on top of the existing virtual photon energy of 10^{-51} J. The virtual photons are part of a vast linked network of virtual photons that permeates the whole of the Universe and their base energy cannot easily be disrupted.

Gravity

To understand Dark Matter, it's essential to overview gravity according to Augmented Newtonian Dynamics (AND). This theory posits that electrons within atoms self-regulate their energy by constantly emitting and absorbing virtual photons, preventing energy loss and spiral collapse into the nucleus. The process can be represented as:

$$\mathrm{E}^{\mathrm{emit}} \rightarrow V_{photon} \rightarrow^{absorb} \mathrm{E} \tag{9}$$

$$\mathrm{Alignment}_{\mathrm{virtual}} = \sum_{i=1}^{n} \mathrm{V}_{\mathrm{photon}}, i \cdot \hat{d} \tag{10}$$

where ($\hat{d}$) is the unit vector indicating the direction of alignment, occurring over a brief interval (Δt) (on the order of 10^{-16} s to 10^{-18} s).

If this aligned line of virtual photons intersects another object, it represents the shortest distance between the two objects; manifesting as gravitational force. The effective gravitational force, resulting from the aligned virtual photons between two objects, can be expressed as:

$$F_g \propto \left(\sum_{i=1}^{n} \mathrm{Alignment}_{\mathrm{virtual}} \right) \cdot \frac{m_1 m_2}{d^2} \tag{11}$$

where:

(m1) and (m2) are the masses of the interacting objects, (d) is the distance between the centers of the objects.

This force is pervasive and exceedingly weak—about 10^{41} times weaker than electromagnetic force—because it arises from virtual interactions. The strength of gravity is dependent on the density of the objects involved: more electrons emitting virtual photons leads to more lines of alignment and, consequently, a stronger gravitational effect. When two objects interact, each emits virtual photons, creating an alignment that effectively reduces the space between them, resulting in an attractive gravitational force. An electron orbiting the nucleus at (10^6) m/s would emit and absorb virtual photons around (10^{15}) times per second, reinforcing this alignment without energy exchange. Thus, the tension in

the aether denotes the shortest geometrical distance between objects. The tension in the lines of force due to the brief alignment of the virtual photon aether can be represented as:

$$T \propto \frac{\sum_{i=1}^{n} \text{Alignment}_{\text{virtual}}}{d} \quad (12)$$

This indicates that the tension represents how the aligned virtual photons contribute to the effective gravitational interaction. In this model, the electron's emission and immediate reabsorption of virtual photons result in a transient alignment of the virtual photon aether, contributing to the gravitational force. This framework captures the dynamics of gravity as described in Augmented Newtonian Dynamics while accounting for the stability of the bound electron provided by the rapid emission and reabsorption cycle of virtual photons.

Augmented Newtonian Dynamics (AND) presents a novel perspective on gravity, diverging from traditional views in general relativity and quantum mechanics. It suggests that gravity is not a fundamental force but an emergent property stemming from the interactions of electrons and the virtual photon aether (Dark Matter). Given that Dark Matter constitutes about 85% of all matter in the Universe, allows free passage of electromagnetic radiation, and exhibits very low interaction with matter, it aligns with AND's predictions. Additionally, AND offers compelling insights into the formation of neutron stars, which will be explored in a subsequent paper.

Dark Energy

A comparison of the data supporting the theories of Dark Matter and Dark energy, illustrate that while evidence for the former phenomenon is based on measurable effects, the evidence for the latter theory is almost completely circumstantial. Dark energy, as a repulsive force, doesn't *seem* to align with gravity's role in attracting matter. The idea that the universe is expanding faster and faster, seemingly against gravity's attractive pull, raises significant philosophical and scientific questions. The fact that we can't directly detect or measure dark energy means that dark energy remains a hypothetical concept that is inferred from a few fragile cosmological observations rather than being directly observed. The fact that dark energy is still theoretical means that scientists are actively exploring alternative explanations for the observations that led to its proposal. Looking at supernovas, that are billions of light years distant and inferring that they are dimmer than they ought to be seems rather far-fetched in the context of a foundational theory. At present there is no other theory in cosmology that even begins to approach being founded on such tentative and unascertainable data. Type Ia supernovae (supernovae on which the theory of cosmological expansion is based), are assumed to have a uniform intrinsic luminosity (brightness) based on the idea that they result from the thermonuclear explosion of a white dwarf star that reaches a specific mass threshold. This assumption is crucial for their use as standard candles. However, recent studies suggest that not all Type Ia supernovae are identical. There can be significant variations in their luminosities due to differences in the initial mass of the white dwarf, the amount of material ejected, or the presence of companion stars that could affect the explosion. The light curves (brightness over time) of some Type Ia supernovae show variations that can affect their apparent luminosity, making it harder to accurately determine their distance without taking these differences into account. Also, the very composition of the Galaxies in which these supernovae are situated might result in significant differences in brightness. Type Ia supernovae were once thought to have uniform luminosity, variations in their

properties complicate their role as perfect standard candles for measuring cosmic distances. This has implications for the precision of cosmological measurements like those related to dark energy.

By contrast the evidence for the existence of Dark Matter seems to be almost indisputable, from its discovery by Franz Zwick in 1933 to the in depth studies undertaken by Vera Rubin in the seventies. The presence of Dark Matter seems to be beyond dispute. [4] Rubin, V. C., Ford, W. K., & Thonnard, N. (1980). "The extended rotation curve of the Andromeda galaxy." The Astrophysical Journal, 238, 471–487. The fact that Dark Matter allows for the propagation of all types of electro-magnetic radiation without offering the slightest interference in any direction seems to indicate (1) that Dark Matter is evenly distributed through the Universe and (2) that Dark Matter is indeed the medium through which both electromagnetic radiation and gravity propagate.

Assessing Virtual Photons as Dark Matter

To explore whether virtual photons could account for the missing mass in the Universe and represent Dark Matter, we must consider the mass of the Milky Way, which encompasses both baryonic matter and Dark Matter. Using ($E = mc^2$) with ($E = 10^{-51}$ J\) and ($c^2 = 8.96 \times 10^{16}$ m^2/s^2):

$$m = \frac{10^{-51}}{8.96 \times 10^{16}} = 1.11 \times 10^{-68}\text{kg} \quad (13)$$

Assuming the Milky Way's mass is approximately (6×10^{42} kg):

$$\frac{6 \times 10^{42}}{1.11 \times 10^{-68}} \approx 1.11 \times 10^{110}\text{virtualphotons} \quad (14)$$

These calculations although rudimentary, suggest that low-energy virtual photons (around (10^{-51}J) could feasibly account for the missing mass in the universe in the form of dark matter. (Note: The estimate of the mass of the Milky Way Galaxy includes both Dark Matter and baryonic matter.) However, an even greater consideration than the possible mass of the virtual photon aether that we think of as Dark Matter is the dynamic possibilities that it presents. The presence of a medium such as Dark Matter is thought to be would enable the interaction of all matter in the Universe across vast distances in a manner that exactly emulates Newton's concept of gravity.

Conclusion:

The above calculations indicate that low-energy virtual photons (around 10^{-51} J) may account for the universe's missing mass as dark matter, playing a crucial role in the cohesion of galaxies and the universe. According to Augmented Newtonian Dynamics, every particle interacts with every other particle through dark matter, influencing the structure of the Milky Way. This concept of a dynamic network of virtual photons offers a fresh perspective on how dark matter exerts gravitational effects while maintaining minimal interaction with ordinary matter. Each particle experiences attraction mediated by this widespread dark matter. These insights encourage further investigation and a reconsideration of existing theories, paving the way for new discussions on the subject.

Augmented Newtonian Dynamics develops Newtonian theories in such a manner as to extend its reach to the sub-atomic realm. (AND) shows that Newtonian theories are as relevant today as when they were founded. For instance, when Newton said:

"That every body attracts every other body with a force which is directly proportional to the product of their masses, and inversely proportional to the square of the distance between their centers. And that the

force of attraction is proportional to the density of the body, as the mass is contained in a given volume." (— Isaac Newton, Philosophiæ Naturalis Principia Mathematica, Book 1, Section 1)

Augmented Newtonian Dynamics effortlessly replicates Newton's ideas about how gravity or for that matter light acted. By including the missing component, namely a medium through which these phenomena propagated, on a sound footing, Augmented Newtonian Dynamics, puts classical physics back in the running.

If the aether were to exist as a fundamental medium (which is consistent with many of the observations surrounding dark matter), we might find that special relativity is an approximation rather than a fundamental truth. Instead of needing to assume that space and time are flexible and that objects contract in size and time dilates due to relative motion, we could simply treat space-time as fixed and constant, and treat dark matter as a medium that affects the propagation of electromagnetic radiation (including light).

In such a framework, we would no longer need the complex relativistic distortions (such as length contraction or time dilation) that seem counterintuitive to our everyday understanding of the world. Instead, the universe would operate within a stable and consistent framework where space and time are unchanging—and all observers would agree on distances and times, even as they measure the same events from different points of view.

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