Visual Model of Electromagnetic Interactions of Sub-Photons

William Beaujon, MD

Abstract:

This paper provides a visual based conceptual model and framework to help explain the behavior of electrical, electromagnetic and gravitational phenomenon. The model is conceptual only and the hypothetical particles and interactions presented are simply designed as a way to visualize and understand electromagnetic interactions. Further research needs to be done exploring the possibility that the proposed hypothetical particle and interactions may actually exist. Future improvements to the model may need to be made to help it conform to new scientific discoveries. Examples are provided showing how the framework conforms to many of the behaviors of electricity, electromagnetism and radiation. A hypothetical particle is introduced, referred to as a sub-photon by this paper. The proposed framework relies on previous research in controversial physical models and assumptions such as repulsive gravity and a fractal universe. Despite the reliance on controversial concepts, the model is intuitive in many respects, easy to visualize and not dependent on difficult mathematics. The model can be used as a visual tool to help explain very complex interactions with minimal mental effort. Whether or not the existence of the sub-photon particle and its interactions are later supported by scientific literature, the model can remain a useful way to visualize and understand basic electromagnetic interactions. This paper includes predictions about celestial bodies and gravitational waves that can be used to test the model in future research.

Introduction:

The current textbook and institutional teaching of electromagnetism and radiation consists of the introduction of extremely complex theories, often involving the use of vague illustrations and challenging mathematics. The complexity greatly slows the rate of learning for students and researchers and also makes computer modeling more difficult. A visual model for understanding complex processes of electromagnetic and radiation can help to make teaching these subjects faster and more effective. A visual model can also help with construction of computer models for prediction of complex behaviors. The model proposed in this paper allows for the visualization of many of the properties of magnetism, induction, gravity and electromagnetic radiation while largely avoiding the discussion of mathematics.

Basic underlying assumptions of the visual model:

1. Gravity is pushing or repulsive force. (All forces are repulsive/pushing). A repulsive gravity concept was popularized by Le Sage and other researchers [3,7]. Objects and celestial bodies are pushed together by radiation pressure due to a difference of forces. One side of the celestial body is exposed to more gravitational waves while the other side is exposed to less (shielded area).

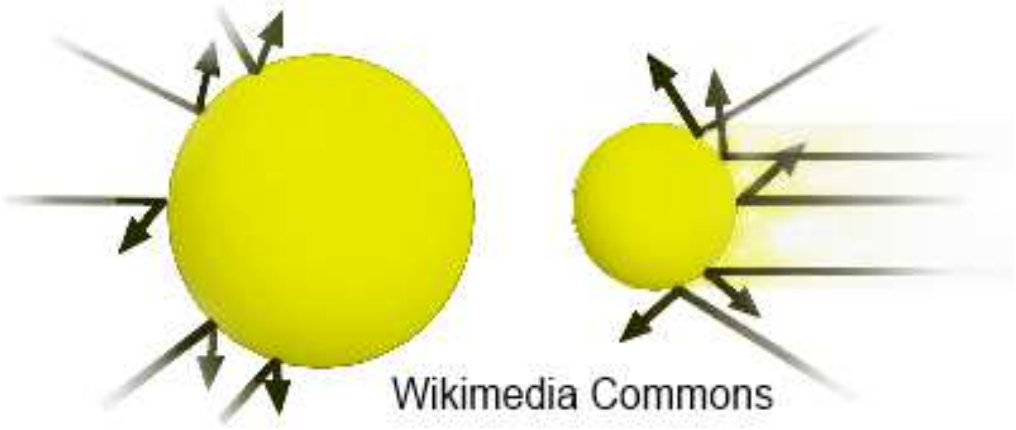

Figure 1. Repulsive gravity illustration.

2. Matter and the universe are fractal in nature, consisting of increasingly smaller and smaller particles the closer one explores.
3. Smaller particles in the fractal universe are the building blocks of larger particles.

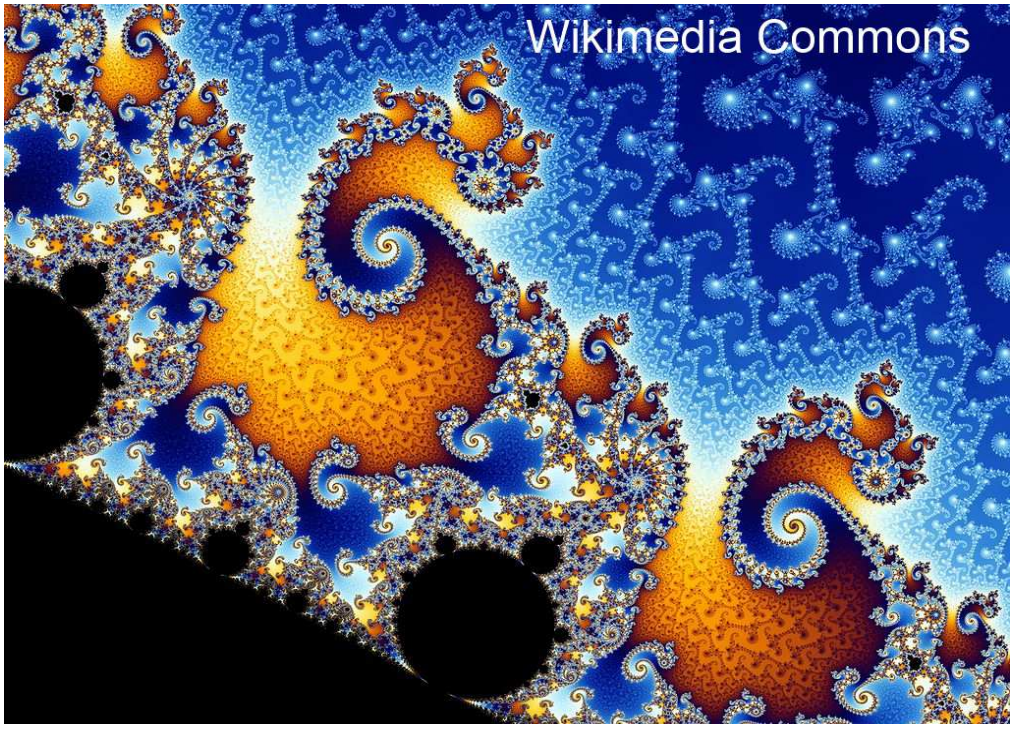

Figure 2. Fractal.

New Visual Concepts:

1. This model proposes that both gravitational and electromagnetic waves are caused by the same extremely small particles whose size is a fraction of the smallest electromagnetic wavelength.
2. Gravitational and electromagnetic waves differ only in their wavelengths.
3. The Sub-photon is the newly introduced particle that is the building block for construction of both gravitational and electromagnetic waves.
4. Sub-photon is the particle that is the building block of elementary subatomic particles.
5. A sub-photon consists of a nucleus (sun) particle and rotating planetary particles.

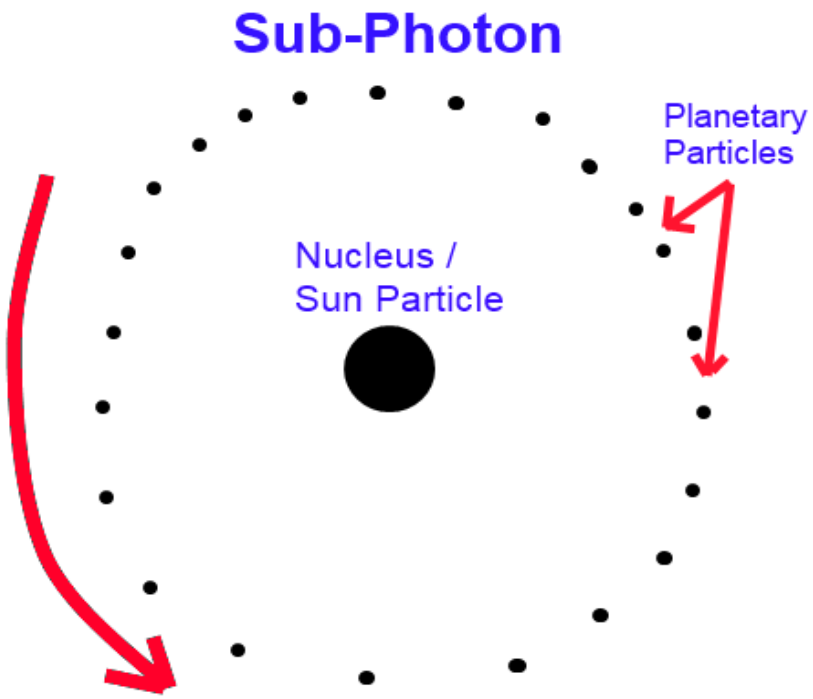

Figure 3. Sub-photon structure.

Electromagnetic Waves:

1. Traveling sub-photons that are polarized (rotating) in alternating directions create both electromagnetic waves and gravitational waves.
2. Electromagnetic waves have a (typically shorter) wavelength that resonates with atoms or larger objects.
3. Sub-photon particles of electromagnetic waves originating in space have poor penetration into celestial objects compared to gravitational waves and predominantly resonate with atoms in the outer layers (atmosphere, crust) of celestial bodies. They tend to exert a force (radiation pressure) there.
4. Electromagnetic waves typically have a higher electromagnetic frequency than gravitational waves.
5. If an electromagnetic wave encounters matter and does not resonate, it can exert a weak radiation pressure, giving electromagnetic waves a similar weak interaction to a lower frequency gravitational wave.

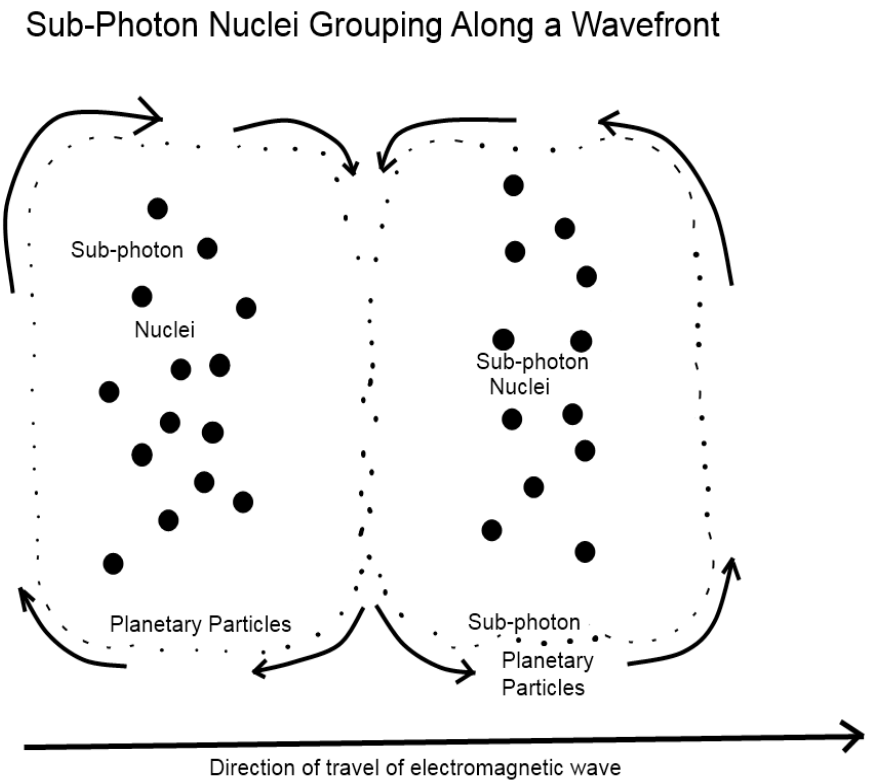

Figure 4. Sub-photon nuclei grouping together and sharing planetary particles in an electromagnetic wave.

Gravitational waves:

1. Gravitational waves are composed of sub-photons with an electromagnetic wavelength that is too long to resonate with atoms, molecules or most larger objects.
2. Gravitational waves typically have extremely long wavelengths. Since these waves have a wavelengths too long to resonate with most objects, they have little electrical interaction with matter they penetrate.
3. Waves of sub-photons can exhibit both gravitational wave effects and electromagnetic wave effects, especially for waves of low frequencies.
4. Sub-photons of gravitational waves weakly interact with matter and exert radiation pressure on elementary and composite subatomic particles.
5. The sub-photon planetary particles of electromagnetic and gravitational waves rotate at high velocities around their nuclei and have an extremely high inherent frequency. This high frequency of sub-photon planetary particle rotation gives it properties that resonate with elementary and composite subatomic particles.
6. Gravitational waves cause a weak radiation pressure when individual sub-photons resonate with subatomic particles.
7. Sub-photon particles of gravitational waves contribute to physical pressures in celestial bodies by a cumulative effect of weak interactions on large numbers of subatomic particles.
8. The repulsive forces and interaction by sub-photons of gravitational waves supports the stability of subatomic particles.
9. A gravitational wave will exert more pressure on atoms that contains larger numbers of subatomic particles.

Sub-Photon Interactions:

1. Sub-photons that are aligned along their planes of rotation and have planetary particles that are rotating in the same direction will have their sub-photon nuclei (sun particles) pushed together. The sub-photon's orbiting planetary particles will tend to follow the same path, causing a "shielding effect" around their respective sub-photon nuclei. This "shielding effect" provides the force that pushes the sub-photon nuclei together.

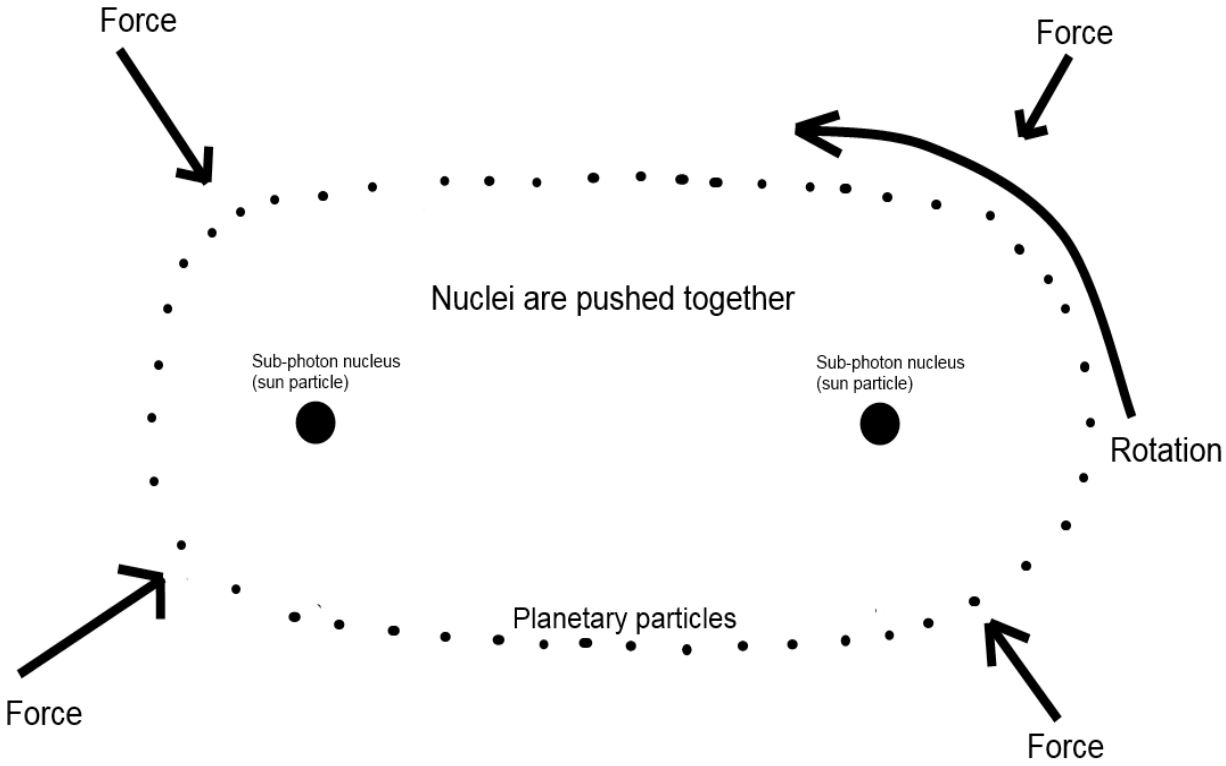

Figure 5. Sub-photon nuclei being pushed together by sharing of planetary particles.

2. Sub-photons that are aligned on their planes of rotation but their respective planetary particles are rotating in opposite directions will repel each other.

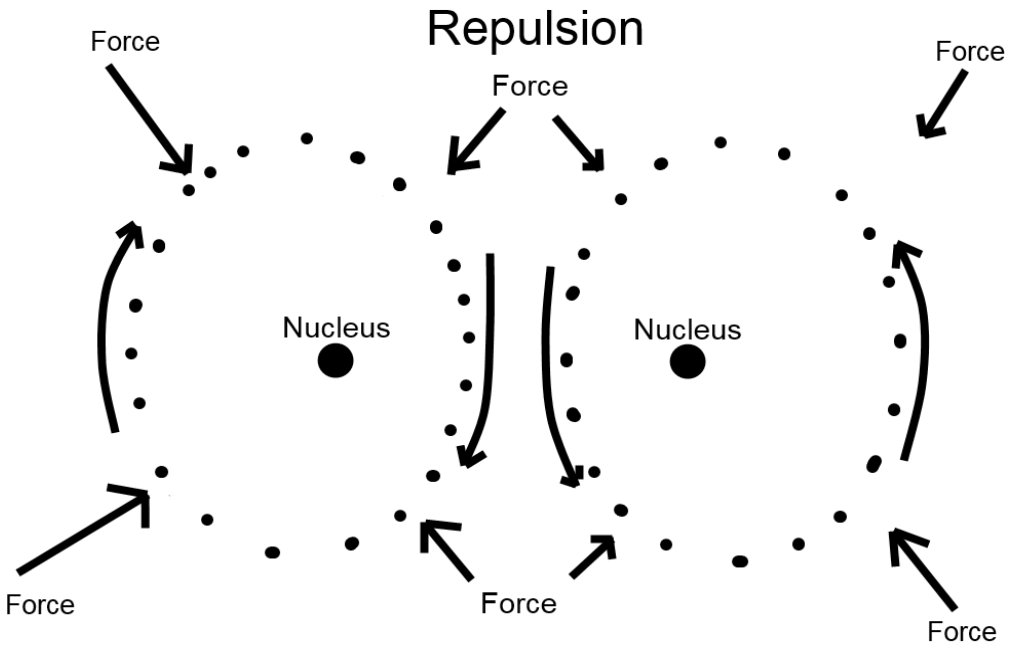

Figure 6. Sub-photons being repelled due to counter-rotation of their planetary particles.

3. Sub-photons that are aligned along their axis of rotation (electrical axis) will repel each other if their planetary particles are rotating in the same direction.

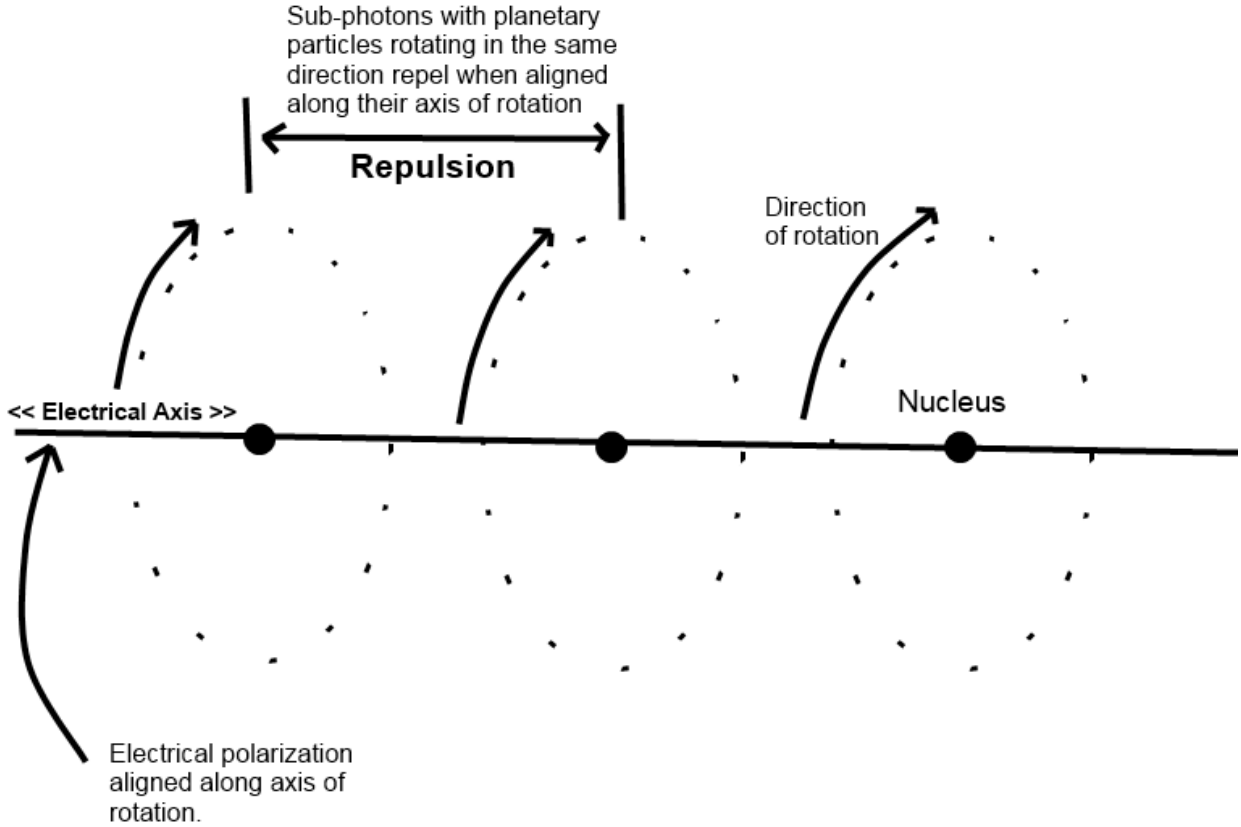

Figure 7. Sub-photons aligned along their electrical axis causing repulsion of their nuclei.

4. Sub-photons that are aligned along their axis of rotation and have planetary particles that are rotating in opposite directions will be pushed together.

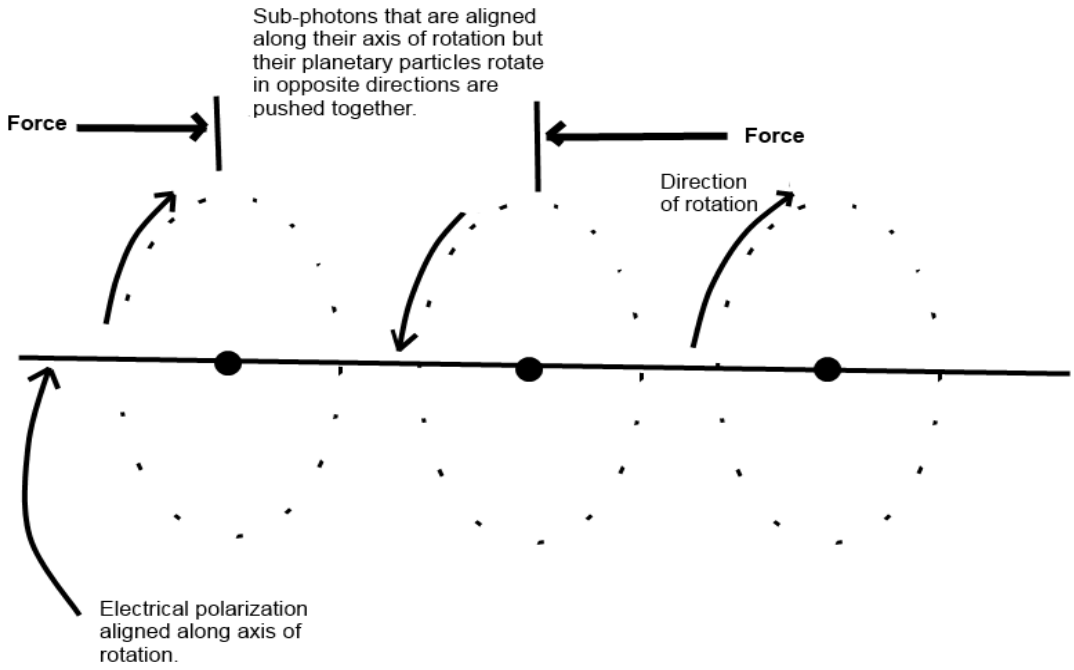

Figure 8. Sub-photons nuclei aligned along their rotational axis are pushed together by anti-parallel rotation of their planetary particles.

Interactions between sub-photons and conductors:

1. Electrical current creates a rotating “cloud” of sub-photons around the conductor with their direction of rotation dependent on the direction of electrical current. The sub-photon nuclei of the inner layers of the "cloud" or "field" are integrated with the conductor.

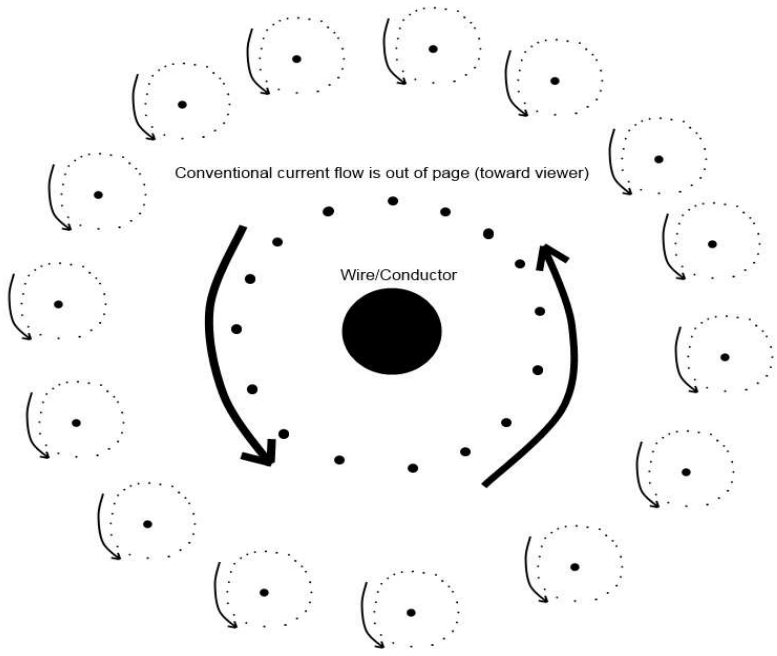

Figure 9. A conductor with conventional electrical current flowing out of the page (toward viewer) creates a counter-clockwise rotating field of sub-photons. The outer layer of sub-photons are shown intact. The inner sub-photon nuclei are shown bonded to the conductor while their planetary particles rotate.

2. If the current flow in a conductor reverses (alternating current), a layer of sub-photons with opposite polarization will be created inside of the existing sub-photon “bubble.” Since these layers of sub-photons are oppositely polarized and oriented along their planes of rotation, they will repel each other. This repulsion will cause the outer layer to be expelled into space, creating an electromagnetic wave.

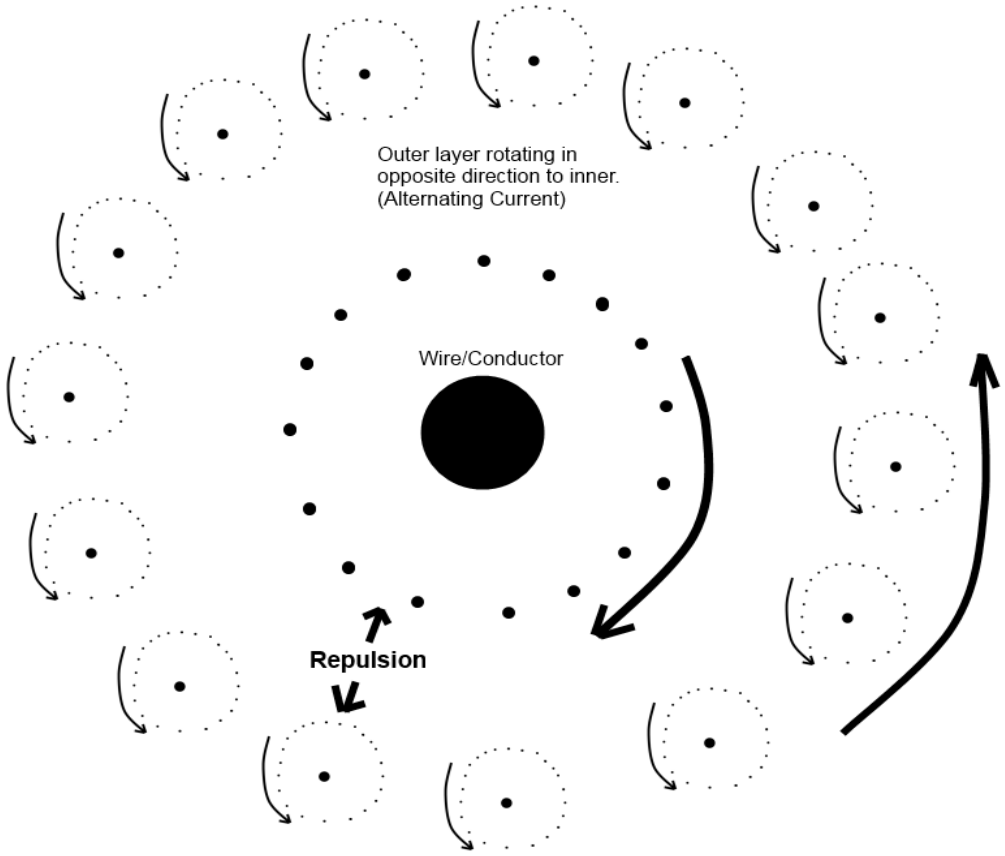

Figure 10. A conductor with alternating current flow will create layers sub-photons with opposing rotation directions. When the conductor's acceleration slows in one direction, a repulsion will be formed between the inner and outer layers, causing ejection of the outer layer into space.

3. Parallel conductors that have current flowing in parallel will have sub-photon “clouds” or "fields" rotating in the same direction and will be pushed together based on principles previously described. The integration of sub-photon nuclei into the atoms of the conductors creates a bond between sub-photon nuclei and the rotating "cloud" or "field" circulating around the conductor. This bond between the conductor and the sub-photon nuclei causes the conductors to be pushed together along with their sub-photon "clouds." This model is consistent with basic knowledge regarding attraction between parallel current carrying conductors that has been noted by historical researchers such as Ampere, Maxwell, Lorentz and Faraday [4,6].

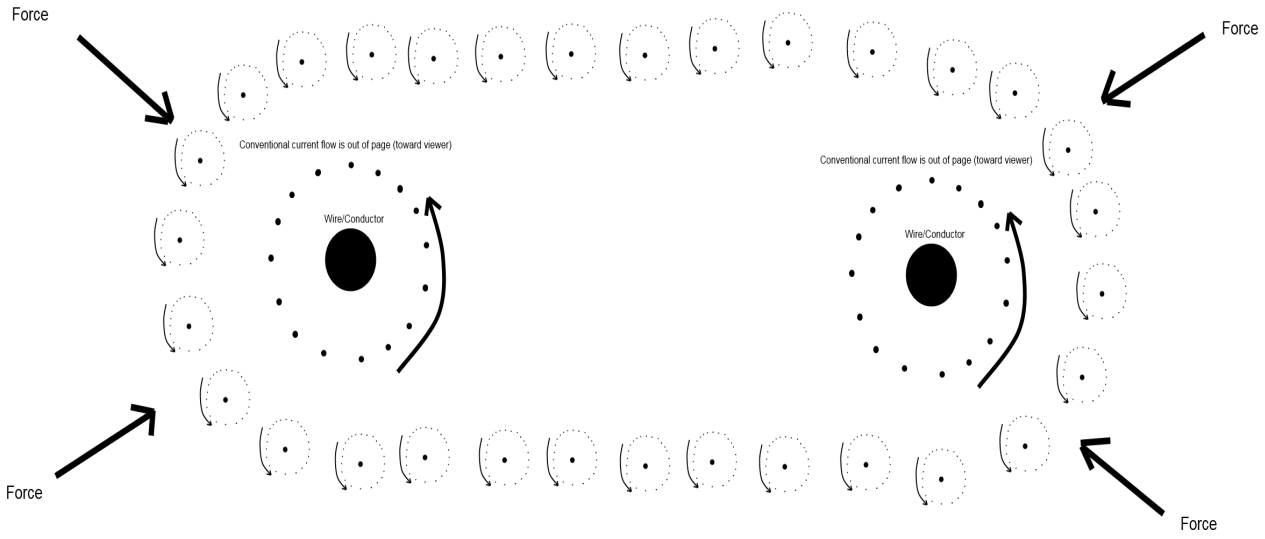

Figure 11. Conductors with parallel current flow will form sub-photon fields rotating in the same direction. The sub-photons rotating in the same direction will share paths by a process called "shielding". The conductors will be pushed together.

4. Parallel conductors that have oppositely directed current flow (anti-parallel) will have sub-photon "clouds" that are rotating in opposite directions and will be repelled by principles previously discussed.

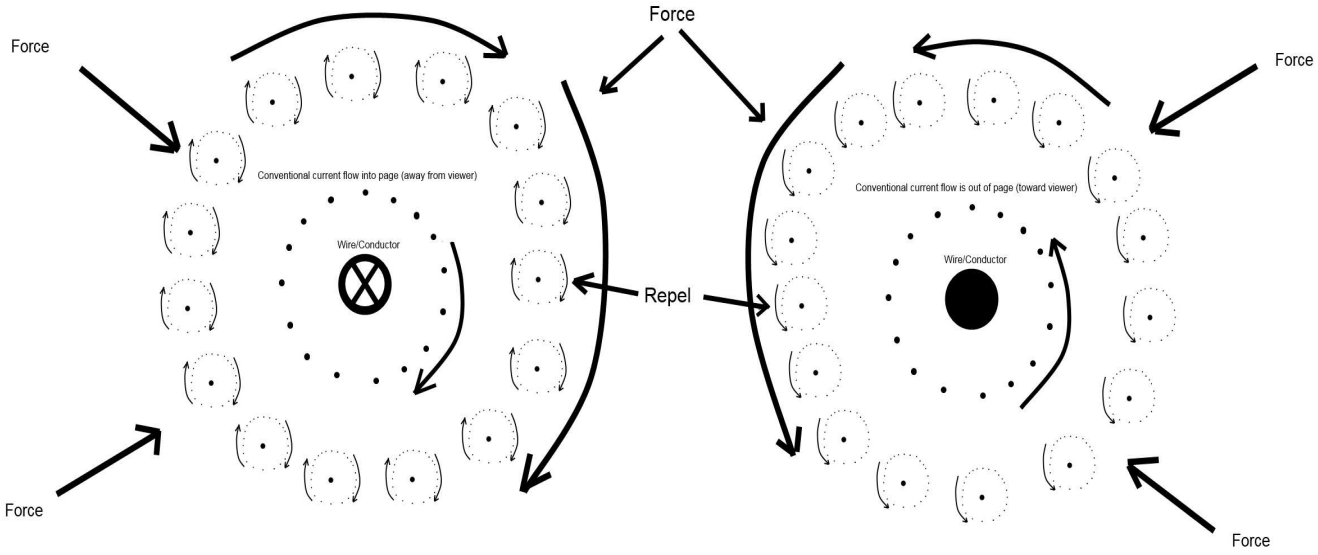

Figure 12. Conductors with anti-parallel current flow will be repelled. Their sub-photons are unable to participate in "shielding" due to oppositely rotating planetary particles.

5. If sub-photons traveling together along a wave front of an electromagnetic wave are aligned along their planes of rotation and rotating in the same direction, these sub-photons will be pushed together and their nuclei will tend to clump. This force that pushes similarly polarized sub-photons together along a wave front creates a magnetic axis and "magnetic lines of force" in traditional nomenclature.

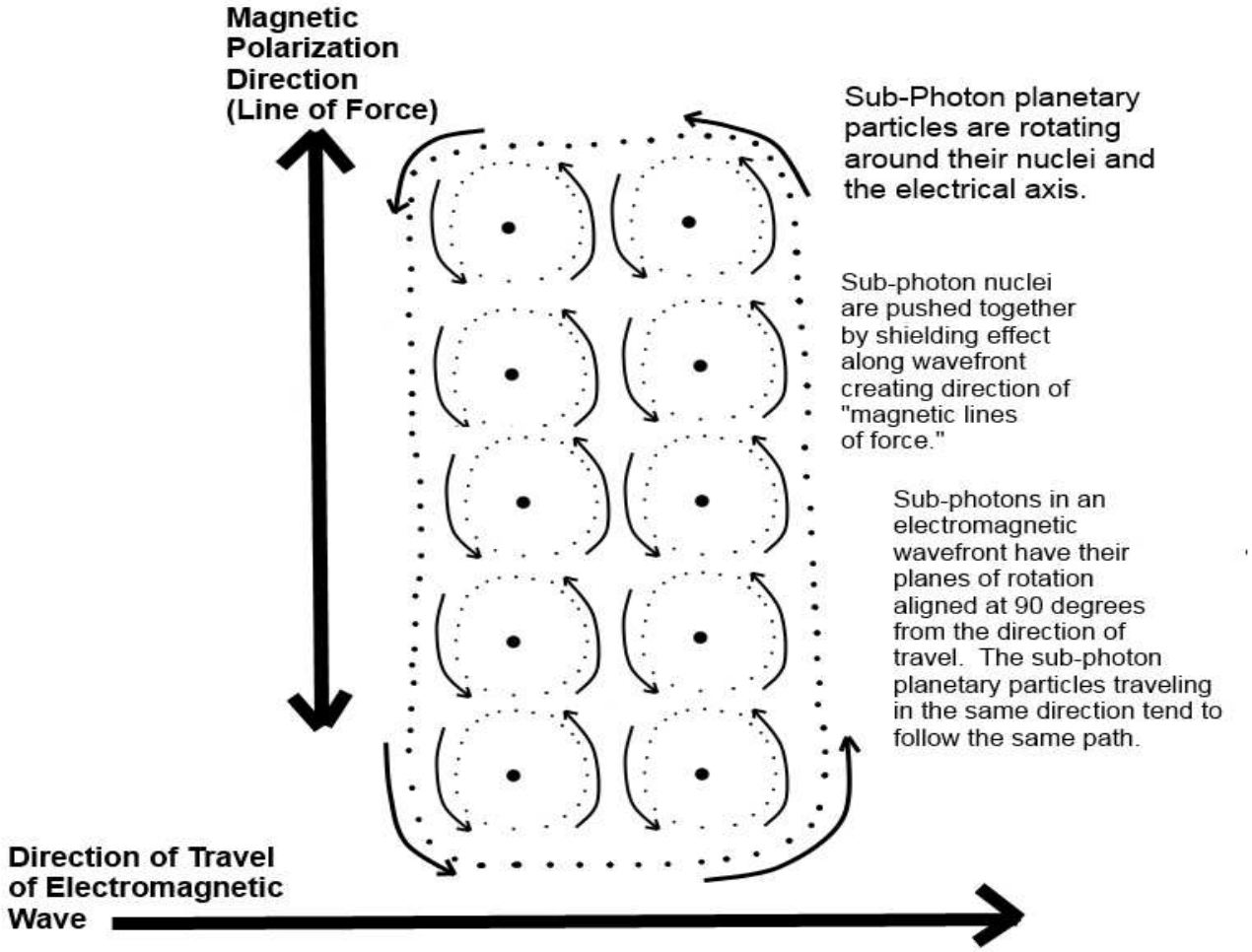

Figure 13. This is a simplified lateral view of a small portion of an electromagnetic wave front. Notice how the sub-photons rotating in the same direction form groups and share planetary particles.

6. If an electromagnetic wave traveling through space encounters an antenna or other conductor, it creates an inductive "cloud" or "field" of rotating planetary particles around the conductor. As this outer "field" of polarized sub-photons surrounds the area around the conductor, the existing sub-photons of more interior layers are are polarized in opposing directions in reaction to the incoming field. This outer field compresses the inner field of oppositely polarized sub-photons and pushes them closer to the wire and their sub-photon nuclei are incorporated into the atoms of the conductor. Notice the outer electromagnetic wave is rotating counter-clockwise in this example. The oppositely polarized inner field is rotating clockwise.

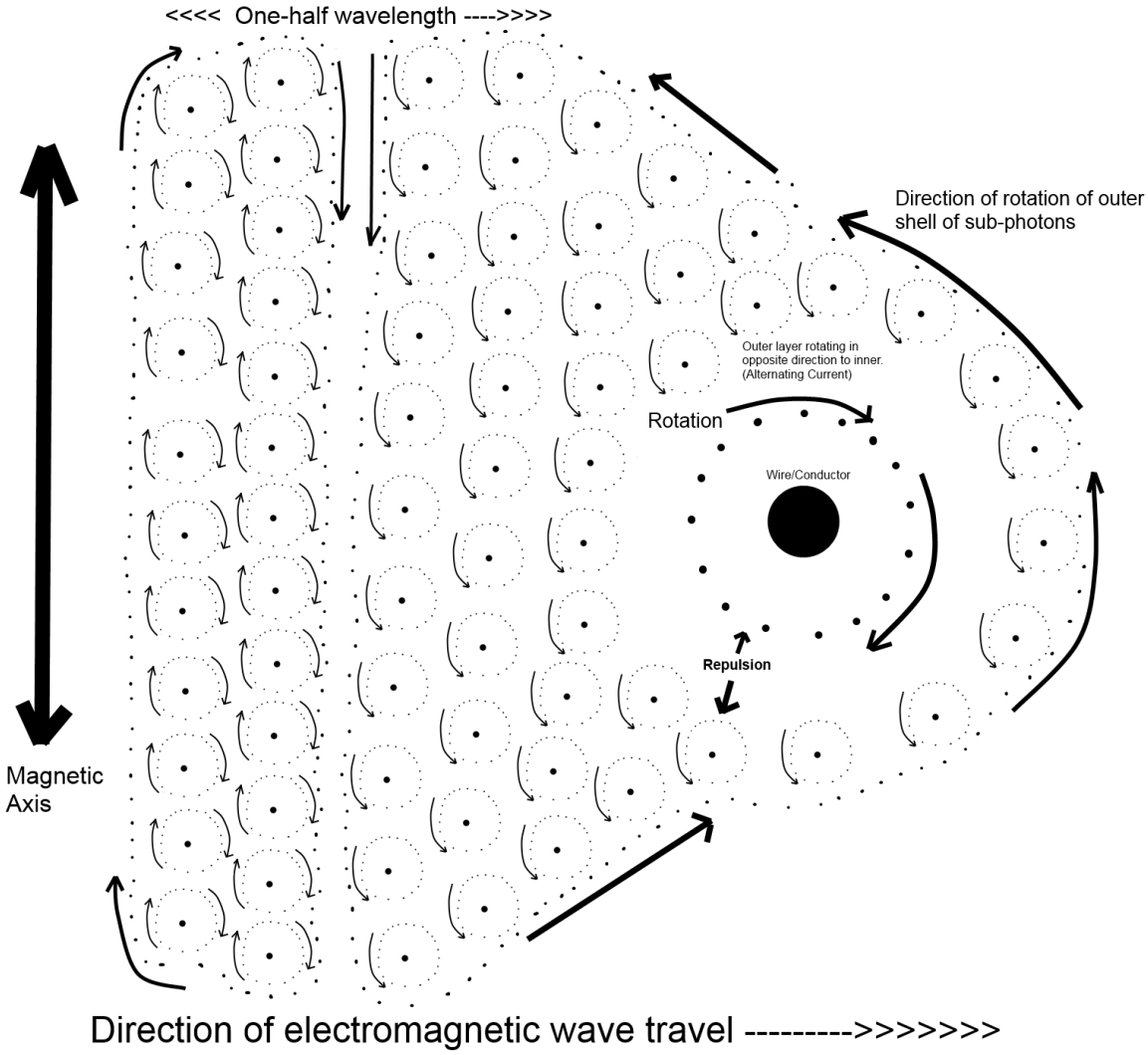

Figure 14. An electromagnetic wave approaches an antenna. Notice how the outer layer of counterclockwise rotating sub-photons compresses an inner layer of clockwise rotating sub-photons into the conductor.

7. After sub-photons are compressed along the antenna/wire, some sub-photon nuclei are incorporated into atoms of the wire. As the lower field of sub-photon planetary particles becomes compressed by the counter-rotating field above them, they are forced into an axial alignment. Once sub-photons are aligned axially and rotating in the same direction, the repulsion between sub-photon nuclei pushes these nuclei along the conductor in both directions.. Since these axially aligned sub-photons have planetary particles rotating in the same direction but they travel axially in opposing directions, the axially moving planetary particles form right and left hand helical structures as they move along the conductor in opposing directions. Sub-photons traveling as left-handed helical structures cause electrons to be pushed into this direction. Sub-photons traveling as right-handed helical structures cause the formation of “holes” , in agreement with common electrical terminology.

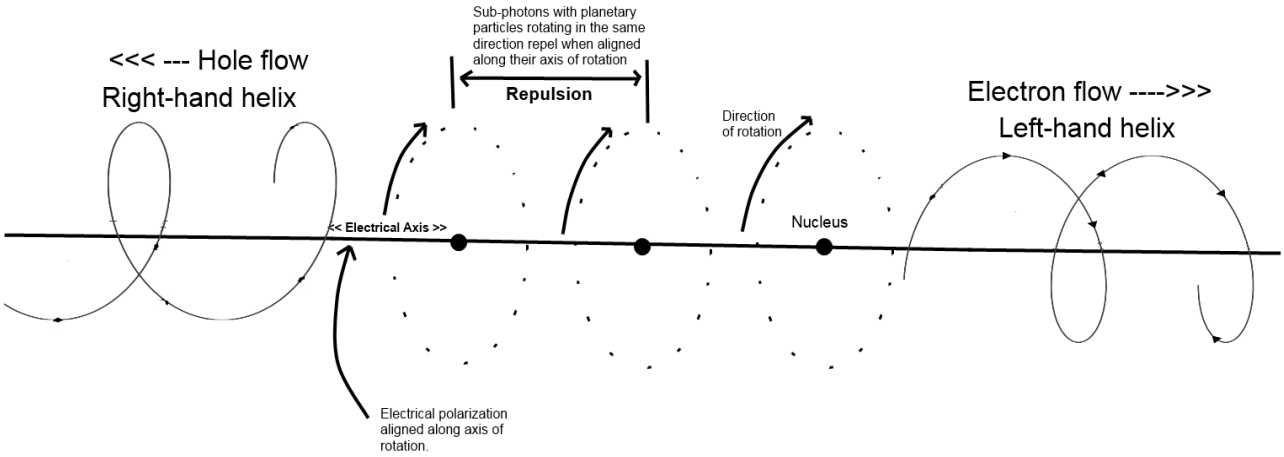

Figure 15. Sub-photons are rotating in the same direction and aligned on their axis of rotation. Repulsion between sub-photons pushes nuclei along the conductor in both directions, causing the formation of right and left-handed helical structures as their planetary particles rotate.

8. The illustration below shows the right hand rule for determining the direction of magnetic field lines based on conventional current flow [1,2]. Notice how that direction of rotation of planetary particles conforms to the direction of magnetic field lines as given by the right hand rule. Conventional current flow (hole flow) is in the direction of the thumb and electron flow in the opposite direction.

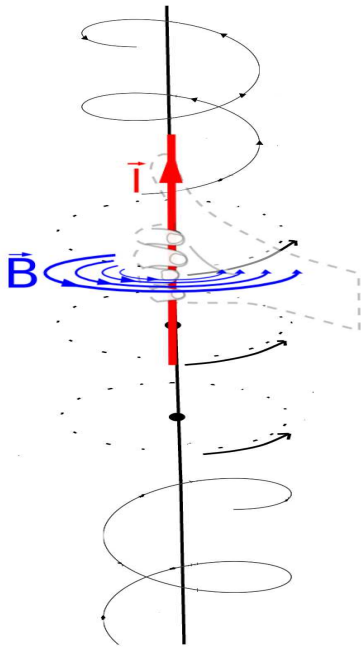

Figure 16. Right hand rule. If the thumb is placed in the direction of conventional current flow, the fingers curl around the conductor in the direction of sub-photon rotation. Electron flow correlates with a left-handed helix. Hole flow correlates with a right-handed helix.

Electromagnetic Forces:

1. Magnetic force is created between atoms when their bound sub-photons are rotating with their planes of rotation parallel to each other. Objects surrounded by fields of bonded sub-photons will be pushed together if their planetary particles rotate in the same direction along the plane of rotation. Objects will be pushed apart if their sub-photon planetary particles are aligned along their planes of rotation but are rotating in opposing directions.
2. Induction is an energy stored by the opposing force of the "bubble" of plane-aligned and rotating sub-photons. The rotating field of the conductor's bonded sub-photons create an outward force while sub-photons or smaller particles originating from space are impacting and pushing inward. This “bubble” of inductive energy can be created either by an electromagnetic wave of sub-photons originating from outside the conductor that travels near a conductor or by current passing through a conductor. The larger the area and the more concentrated the plane-aligned sub-photons in the "bubble" is, the more energy is stored in the “bubble” by induction. This visual model is consistent with basic theories of induction [5].
3. Electric current, electrostatic forces and capacitance [8] are phenomenon created when atoms have bound sub-photon nuclei with planetary particles that are aligned along their rotational (electrical) axis. If the rotation is in the same direction (parallel), the respective atoms of the bound nuclei are pushed apart (repulsed). If the rotation is anti-parallel, the respective atoms of the bound sub-photon nuclei are pushed together.

Energy storage in the electromagnetic wave:

1. As described earlier, the current flow in a conductor, atom, molecule or other structure creates a "field" or "bubble" of polarized sub-photons along the electrical axis of the sub-photons. This sub-photon "field" is bound to the conductor if electricity is in the form of direct current, creating a stable "bubble" or "field" of circulating sub-photons.
2. Energy is input into an electromagnetic wave in two ways. Higher electrical current in a conductor or object polarizes more sub-photons and forces them into a limited space, requiring energy. The sub-photon nuclei form dense "clumps" as they are compressed into a smaller space and share planetary particles. Higher frequency waves will force oppositely polarized "clumps" of sub-photons closer together, requiring energy. Once the direction of current flow within an object changes direction, the inner field of sub-photons will repel the outer field, releasing the sub-photons into space. This model is consistent with current formulas that correlate frequency with energy of the electromagnetic wave [9] and inductive reactance with current flow [10].

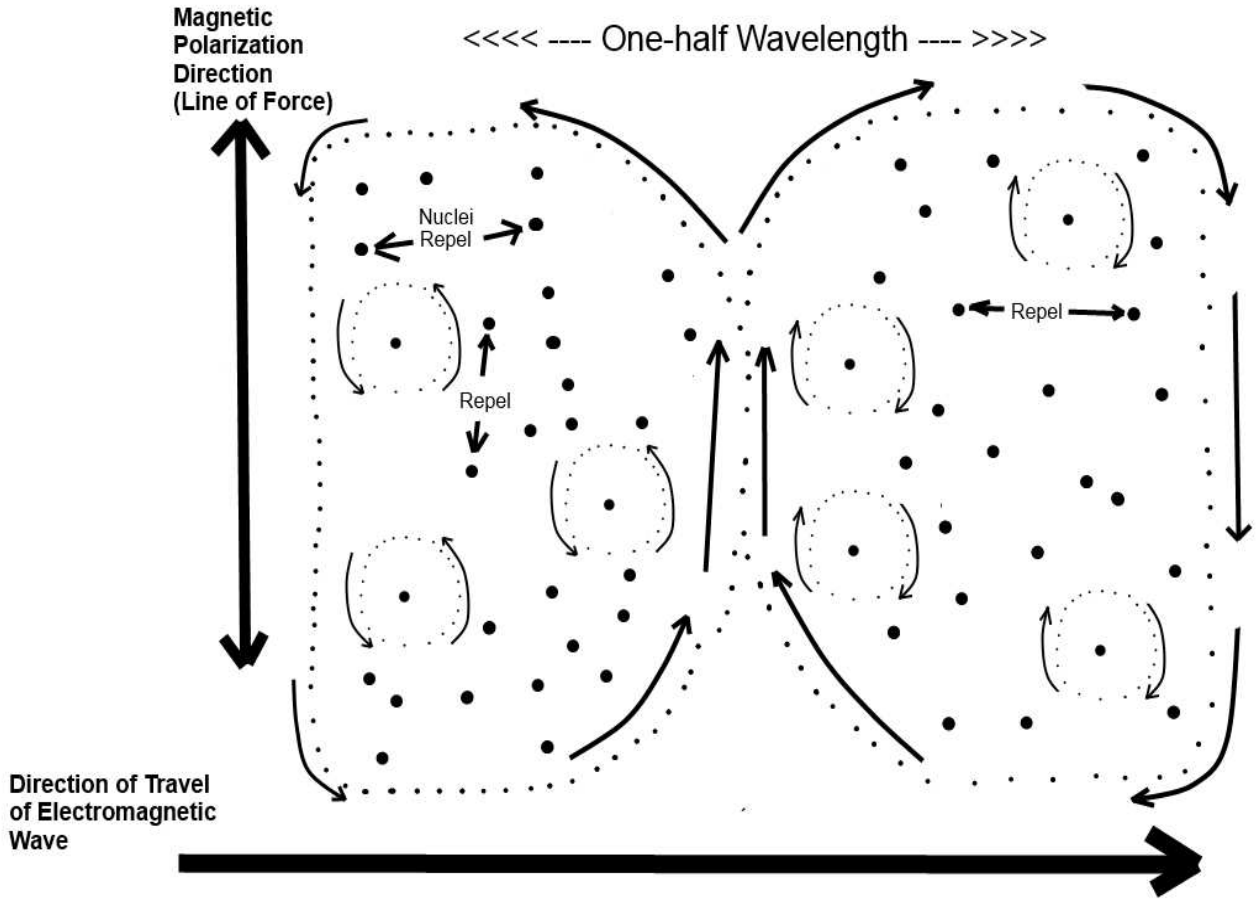

Figure 17. A lateral view of a small portion of an electromagnetic wave is shown. Energy is input into the wave by either compressing more sub-photons into a given space or by increasing the frequency thereby shrinking the available space.

Particle Predictions:

1. The smallest elementary subatomic particles are constructed of "packaged" sub-photons.
2. Larger sized elementary particles are constructed of groups of smaller elementary particles.
3. Composite particles (electrons, protons, neutrons) are composed of "packaged" elementary particles with preference for stable arrangements.
4. Atoms or groups of atoms can absorb and radiate energy as electromagnetic waves or packaged as subatomic particles.

Celestial Body Predictions:

1. Atoms, molecules and larger structures within a celestial body create electromagnetic waves. These waves, due to their higher likelihood of resonance and interaction compared to gravitational waves, tend to exert their energy and radiation pressure on nearby atoms or larger structures, most of which are within the celestial body.
2. Pressure created by electromagnetic waves within a celestial body creates an average force outward from the core that tends to oppose inward pressure caused by gravitational waves.

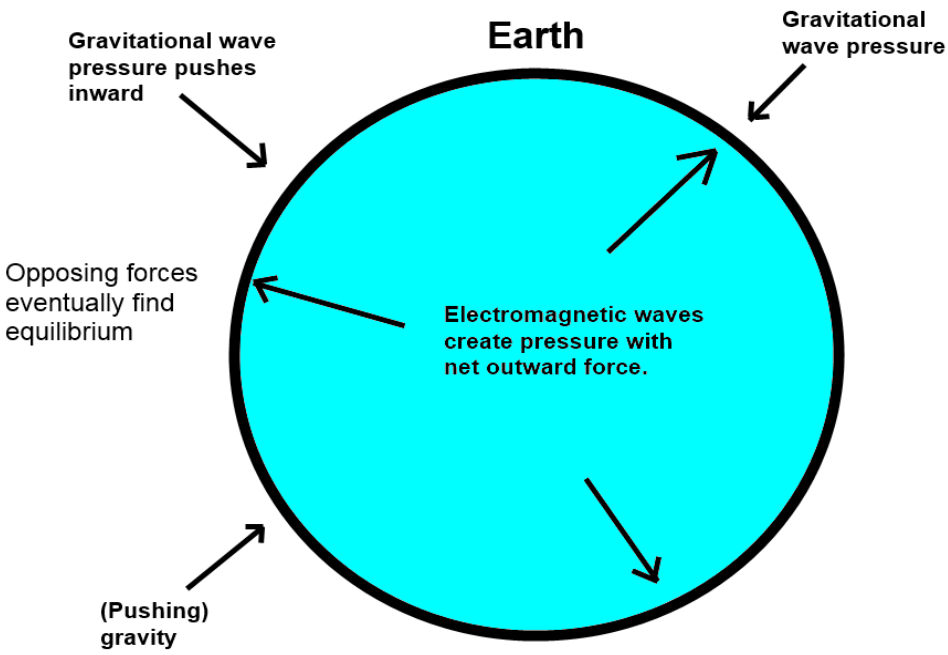

Figure 18. Electromagnetic waves are produced within a celestial body and their net pressure is outward. Gravitational waves create a net inward pressure. Equilibrium is reached.

Gravitational Shielding and Predictions:

1. Gravitational shielding is a concept that suggests the concentration of gravitational waves (composed of sub-photons) in space is finite and that large celestial objects can, by way of their large mass, transform most or all incoming gravitational waves into electromagnetic waves, creating internal physical pressure.
2. The concentration of gravitational waves in a large celestial object will gradually diminish from the outer atmosphere towards the core of the object due to transformation of gravitational waves into electromagnetic waves or particles.
3. The probability that a gravitational wave will interact with subatomic particles of an atom is increased when atoms are of higher atomic mass.
4. Gravitational waves contribute to the internal pressures in celestial bodies needed to create atomic particles.
5. Complete (or near complete) gravitational shielding contributes to the breakdown of larger atoms or particles into smaller atoms or particles and electromagnetic waves (nuclear fission).
6. Areas in space of gravitational shielding (reduced concentration of gravitational wave sub-photon particles) are present near and inside large celestial objects.

Large Celestial Object and Predictions:

Atmosphere and Outer crust:

1. Outer layers or celestial bodies are impacted by a high number of both electromagnetic and gravitational wave particles (sub-photons).
2. Outer layers have a high "gravitational wave pressure" from sub-photons originating in space.
3. Outer layers have a lower internal physical pressure than the mantle (middle layer) and core due to its more peripheral location.
4. Atoms with a high molecular weight that may have migrated into the outer layers have more

interaction (due to numbers of protons and neutrons) with gravitational waves and are pushed inward towards the core with more force than lighter elements.
5. Heavier elements in outer layers gradually undergo nuclear decay (radioactivity) due to lack of physical pressure.
6. A gravitational wave can exert pressure on individual electrons, causing some electrons to be pushed toward lower layers of a celestial body, contributing to the ionization of atoms in outer layers. This phenomenon is proposed to contribute to the atmospheric electric potential gradient.[4]

Middle (mantle) region (between crust and core):

1. Has the highest theoretical concentration of electrons (and lowest ionization levels) of all the layers of the celestial body.
2. High electron concentration and high physical pressure contribute to stability of neutrons and prevents radioactive decay.
3. Combination of neutron stability, moderate gravitational wave radiation pressure and high physical pressure in this region contributes to nuclear fusion. Atoms and their nuclei are pushed together, forming heavier elements (nickel, lead, iron, uranium, etc).
4. Physical pressure is higher than the outer crust

Inner Core (Exists only if celestial body is large enough):

1. Gravitationally shielded by outer layers
2. Reduced or no gravitational wave pressure creates instability of subatomic particles.
3. Instability of subatomic particles, very high physical pressure, high electromagnetic wave density (heat) creates an unstable atomic environment.
4. Combination of low gravitational particle pressure (unstable subatomic particles), and high physical/molecular (actual) pressure triggers nuclear fission.
5. Nuclear fission causes generation of electromagnetic waves (heat) in inner cores of large celestial objects.
6. Fission creates lower molecular weight elements (hydrogen, helium, lithium, oxygen etc) in cores of large objects.
7. Fission creates subatomic particles from atomic particles and atoms.
8. Earth likely has area of gravitational shielding at its core:
9. Fission produces lighter elements from heavier ones contributing to the atmosphere, hydrocarbon content and water contents of medium to large sized celestial objects.
10. Lower mass objects (asteroids, moons, small planets) are likely too small to have an active inner core. These lower mass objects are cooler in general compared to larger objects due to less heat production (no nuclear fission).
11. Diameter of celestial objects (due to greater surface area) largely determines amount of heat produced and amount of lighter elements produced in their cores.
12. Larger celestial objects have larger surface to contact gravitational waves which equates to larger electromagnetic wave (heat) production and higher amounts of light element production.
13. Electromagnetic wave energy density and physical pressure in the core is proportional to rates of nuclear fission, thus heat production and light element (hydrogen, helium, etc) production.
14. Larger celestial objects can produce rates of nuclear fission great enough to “shed” a substantial amount of mass due to the creation of electromagnetic waves or particles with high kinetic energy. The “shedding” process, along with gravitational wave density, limits the size of celestial objects to those observed in the universe.
15. A constant flow of gravitational waves, is necessary to maintain the size and energy

production of celestial objects.

16. If the celestial body is large-enough and rates of nuclear fission in the core is high-enough, the inner core of the celestial body may be much less dense than the middle and outer layers. This core layer may contain widely spaced atoms and electromagnetic waves predominantly in the infrared or higher range. Radiation pressure from electromagnetic waves keeps the atoms and molecules spaced apart in the inner core.

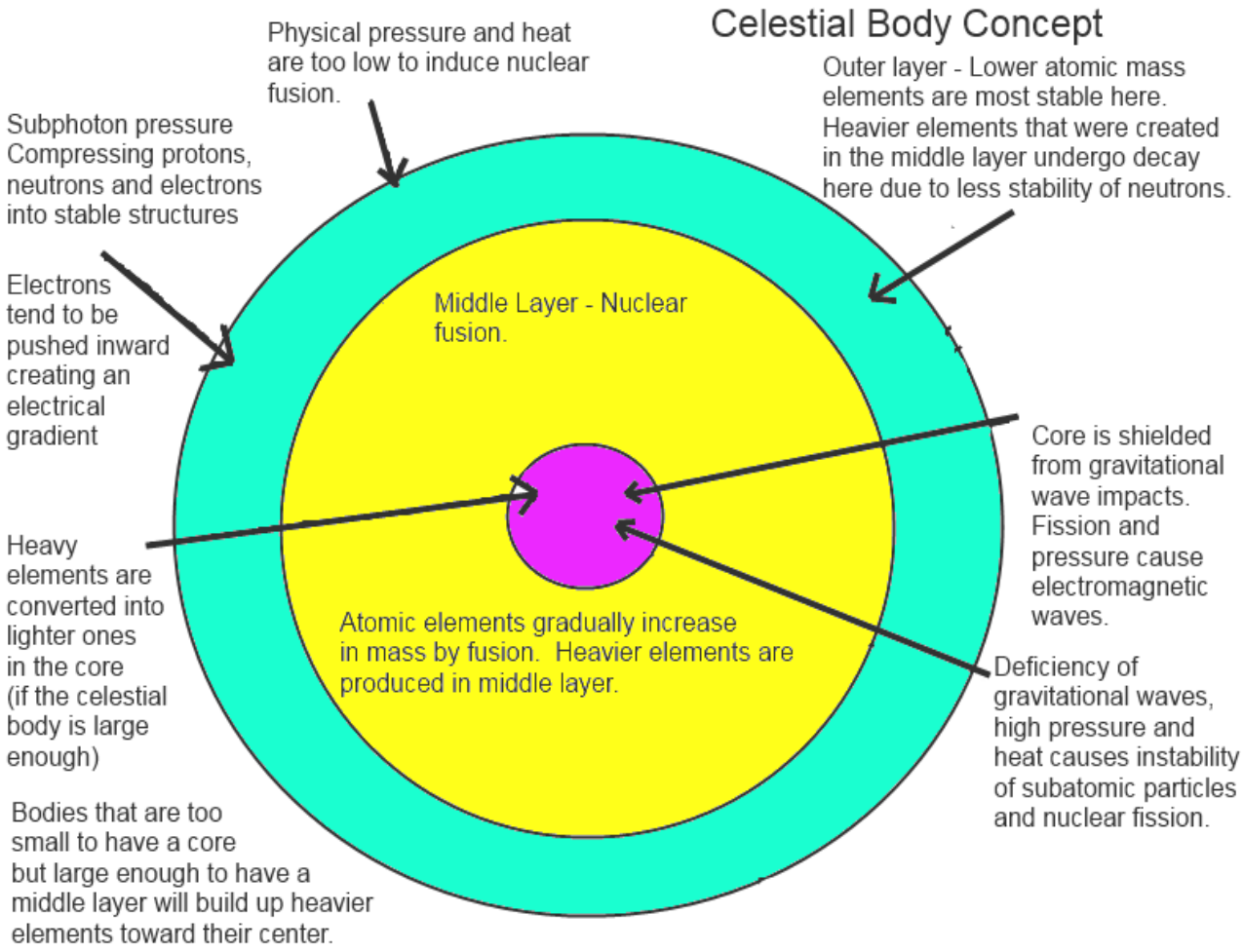

Figure 19. Celestial body predictions based on the sub-photon model.

Conclusions:

The proposed model provides a unique way to visually learn and understand electromagnetism using hypothetical sub-photon particles. It has been shown to conform to basic science regarding electromagnetic interactions. This model can potentially be used to generate computer modeling of electromagnetic behavior and support the development real-time visual feedback programs for researchers. The predictive value of the model remains unanswered but hopefully future research will give us insight into the accuracy of the model and reveal its capabilities.

References:

1. J. C. Maxwell (1861) XXV. On physical lines of force , The London,Edinburgh, and Dublin Philosophical Magazine and Journal of Science, March 1861, 21:139, 161-175, DOI:10.1080/14786446108643033
2. Michael Faraday, On the Physical Character of the Lines of Magnetic Force, Philosophical

Magazine and Journal of Science, June 1852, 401-428. https://doi.org/10.1080/14786445208647033.
3. Sage, G.-L. Le (1818), "Physique Mécanique des Georges-Louis Le Sage", in Prévost, Pierre (ed.), Deux Traites de Physique Mécanique, Geneva & Paris: J.J. Paschoud, pp.1–186.
4. C. T. R. Wilson (1908), On the Measurement of the Atmospheric Electric Potential Gradient and the Earth-Air Current, Proc. R. Soc. Lond. A, 1908, 80, 537-547. doi: 10.1098/rspa.1908.0048
5. Rev. William Ritchie LL.D. F.R.S. (1834) IV. On the reduction of Mr. Faraday's discoveries in magneto-electric induction to a general law, Philosophical Magazine Series 3,4:19, 11-13, DOI: 10.1080/14786443408648242
6. J Clark Maxwell, A Dynamical Theory of the Electromagnetic Field, pp 459-512, Oct 27, 1864.
7. H.A. Lorentz (1900), Considerations on Gravitation, pp 559-608, April 25, 1900.
8. Michael Faraday, On Induction of Electric Currents, Corr Mem Royal Academy of Sciences of Paris, Petersburgh, pp 125-162, Nov 24, 1831.
9. Willy Wien, On the Division of Energy in the Emission-Spectrum of a Black Body, Wiedemann's Annalen, vol. lviii, p. 662 , August 1896.
10. Steinmetz, Bedell, Reactance, Eleventh General Meeting of the American Institute of Electrical Engineers, pp 640-648, May 18, 1894.