A Geometric Model of the Photon

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Abstract

There is no adequate geometric model of the photon in the Standard Model. The reason for this deficit is that there are so any constraints on such models that science in general has given up geometry in favor of mathematics. Unfortunately, mathematics is only the paint by which the artist depicts the external world … not the thing itself. The true world to be depicted is logic instantiated in geometry. The universe is presented to us in the form and function of geometry which is the set of quals by and through which logical principles are realized. Hence, any proposed "understanding" without an objective 3-dimensional geometric base is incomplete.

Here, a new model is proposed … devised from the ground up.

Here are some of the major constraints that weigh upon any proposed geometric model:

1. It has wavelike properties
2. It is quantized
3. It can be focused
4. It naturally diffuses as $1/r^2$
5. It has momentum
6. Add more constraints from your own knowledge …

There are no doubt very many more. So, physics has given up on geometric design and no longer makes models because one model that succeeds in predicting an effect fails in some other experiment … whereas one model must explain all photon related phenomena without further modification.

Here we offer a new model and some proposed experiments by which it might be falsified.

By my investigations there are only two basic ingredients in existence. These are a Euclidean alpha field (α) quantized by uniform cubes and spherical beta fields (β) … one for each cube. The β-fields are *"matter"* (the actors) … the α-field is the stage. The α-field is like a fisherman's net laid out on a beach having no tension. When the fish are placed in the net, they interact with the net to give it an initial *"unit tension",* which thereafter lessens as the fish *"clump up".*

Unit tension creates the transmission velocity through the Euclidean grid … initially, 'c', the speed of light. The β-fields expand at velocity 'c' at the outset. This instantiates an integer count starting at each field origin which is the entire purpose of existence. Thereafter the transmission velocity in the β-field is $R^{3/2}$ where R is the radius of the universe in unit lengths (Hubble radius). So, a signal from the β-field center will reach the Hubble radius in the same time that a signal in the α-field will traverse a proton radius. Note: Both these velocities are FINITE.

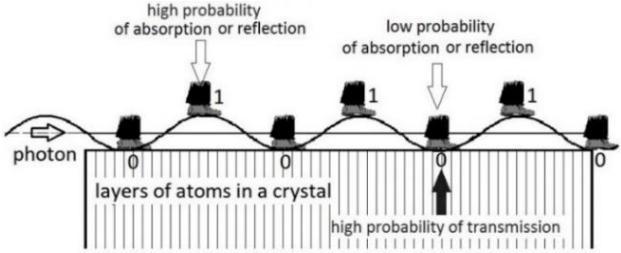
For brevity's sake, the logical justifications for the above are not given because they do not matter. Experimental outcomes matter. If an experiment reveals something predicted, it does not verify the hypothesis. It merely does not rule it out, i.e. the hypothesis is *"still on the table".*

Wavelike Properties

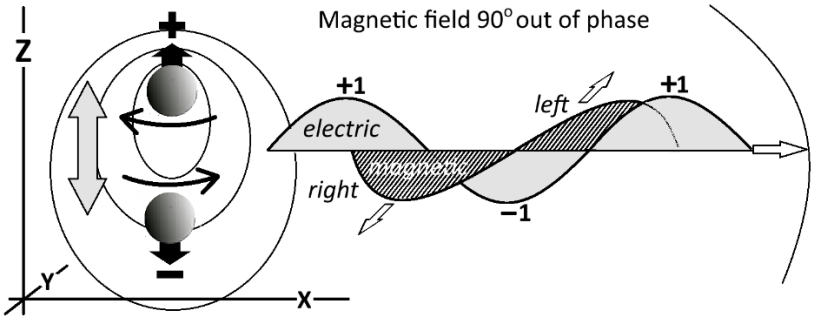
The model of a photon traveling as a sort of ocean wave must be a false representation. It does not conform to Feynman's *"stopwatch"* metaphor, i.e. there is something In the photon that ticks off a time interval that goes low to high probability of absorption. An ocean wave model cannot do this. Any photon model must posit the motion of a *"snake-in-the-grass"*.

It is a walking wave. Like a man taking steps.

Picture an ocean pier piling being hit by an ocean wave. The piling is hit by the crest of the wave and its trough and all points in between. There is no stopwatch element at all in such a continuous traveling wave form. However, if we imagine a snake's motion as it moves over lines drawn on the ground perpendicular to its direction of movement … you see that each line is crossed at a single point. This is the stopwatch that Feynman was envisioning. As it passes, there is a low probability and a high probability at each individual atomic layer instead of equal probability at every level.



We assign the amplitude numbers +1 and -1 to the top and bottom of the electric component, and 0 to the center line. The magnetic field is at right angles to the electric field and has components of right and left handedness ... maximum field strength is on either side of the center line. The center line is then also, the absence of a magnetic field of either hand. The phase of the electric and magnetic fields is offset by 90 degrees, so that maximum electric occurs at minimum magnetic, and vice versa as required for electromagnetic induction.

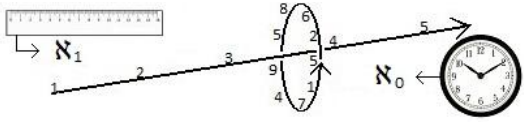


Assigning +1 and -1 in this manner accommodates the fact that a photon can be transformed into an electron/positron pair ... while still maintaining its nature as an electrically neutral phenomenon.

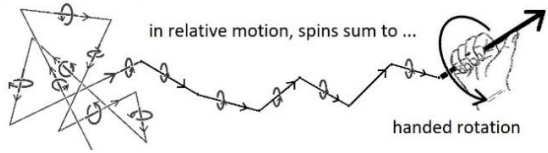
The model will then serve to fulfill Feynman's analysis using the stopwatch metaphor. Also, the square of the amplitude is the same in either case. Here we are changing the Standard Model's assumption that an electron (or any charged particle for that matter) has no *"handedness"* to the opposing view. Here is the correct model of intrinsic *"spin"*.

Rotation is the "*action*" associated with $\aleph_0$, just as linear motion is associated with $\aleph_1$. Consider the YZ plane as the "*complex*" plane in 3-dimensional space, with the X axis as the chaotic motion component.

This rotation produces a "*screw*" sense when combined with the *linear action*. Which screw sense (lefthanded or righthanded) is determined by the logic of "*subjective physics*". Note: $\aleph_0$ is the set of all numbers with an infinite number of digits (the qualitative set). $\aleph_1$ is the set of all numbers with a finite number of digits (quantitative). Ultimately, this causes the 3D display.

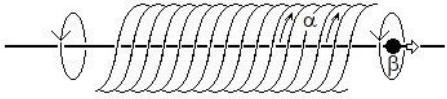


Rotation of the β-field cannot be detected in a particle at rest, because a handed rotation is cancelled by the handedness of that same particle moving in the opposite direction.



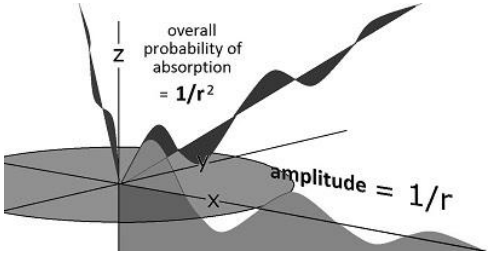
However, if the particle is travelling tangentially relative to an observer, the sum of the extra uncancelled rotations add with the length of tangential displacement, and are observable by way of the magnetic field, induced in the α-field. These rotations sum presently to ~10^{60} rotations per second. The logic here will not be pursued because it has no bearing on the experiments given further on. It is to show that there 'IS' a rationale available.

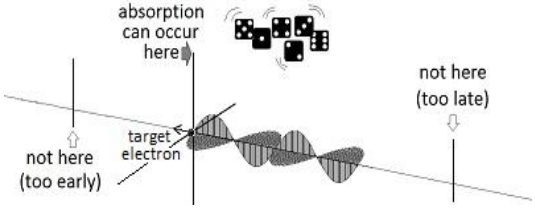
The magnetic field is a handed twist induced in the α-field because the α-field cannot itself rotate and is fixed as an absolute reference frame by the sum of all the other rotations of β-fields which vary.



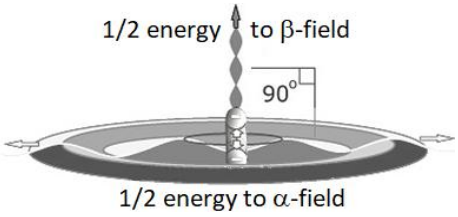
The α-field photon proceeds from its source … typically an oscillating electron … traveling at velocity 'c' as shown below.

This is a *"walking wave"* with amplitude diminishing as 1/r. Because it spreads out as well, the probability of absorption is the square of the amplitude. Any distortion of the α-field is an alteration of probability in that local space. This wave is not the completed model of energy transference; it is the part that models the *"probability of transference".*





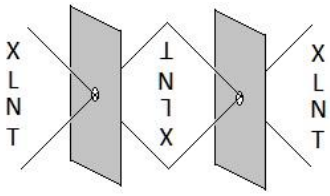
There is another 'piece' to the photon that exists as a uniform gas distributed evenly throughout space. To absorb this artifact requires the simultaneous confluence of a target electron to absorb the photon, the photon probability component (the walking wave), and a third *"Z-component"* which is a linearly localized wave that was created in the β-field analogous to a stone thrown into a pond. Here, a component is ejected from the pond along the Z axis … a quantized bit … ½ of the photon energy.

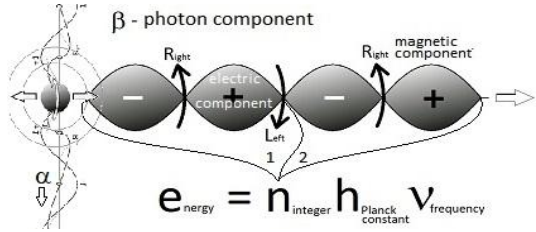


This quantum of energy is in the β-field and travels at the transmission velocity of that field (presently about 10^{39}c). Its wavelength may be greater than the diameter of the universe.

However, it is logically congruent with the wavelength of the probability wave created simultaneously in the α-field.

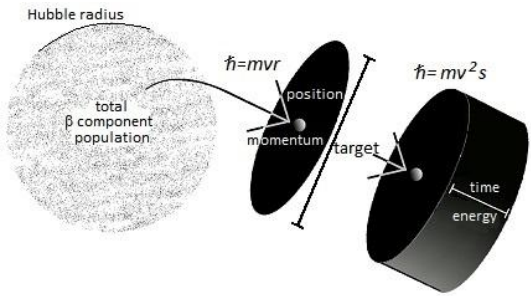
Here is what it looks like:





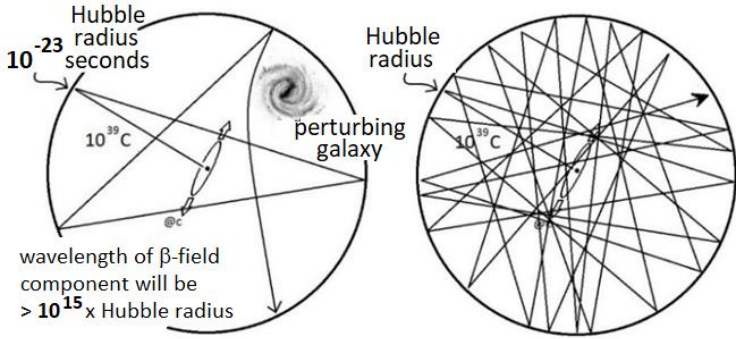
Note: The β component exhibits the symmetry of a *camera obscura.* There are four basic forms that go through the pinhole. X and T show no handedness; T is rotated 180^0 ; X is constant. N and L display handedness with L rotated 180^O and N constant.

Where it is absorbed is dependent on coincidence and the presence of a target particle. These β components fill space as a uniform gas and represent the total potential energy that has been converted into photonic energy by particles falling down any sort of gradient (gravitational, nuclear, electromagnetic). It is by sequestering energy here that matter is allowed to remain clumped. Else it would reheat and disassociate.



The α, β Component Ratio

The photon energy of the β-field will have a linear track originally perpendicular to the radiating alpha wave. But due to its 10^{23} collisions and reflections per second off the Hubble wall of the finite β-field, it is conjectured that, like the α-field, it will be subject to changes in trajectory, due to asymmetries in the surrounding medium of mass concentrations (galaxies). That is, it will end up going all over the place, randomly, in three dimensions, and all emitted β components together will form a uniform sea of energy ("*zero-point*" or "*vacuum*" energy).



Each time it passes through the sphere of the radiating alpha field component ... if there is an eligible target there ... the *quantum mechanical dice* are rolled and if yes, the β-energy is deposited there. If not, then at some other point with the required properties on some other pass through.

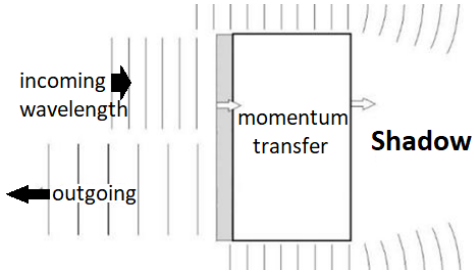
The energy component travels as a line and intercepts the alpha component sphere at only one place at a time. There are no simultaneous dice rolls. Hence, the determination to deposit the energy can be in only one place.

The deposition of energy in this photon model requires the simultaneous collision of the α and β components and a target particle. Therefore, because the total number of β components is finite, the rate of their deposit is also dependent on the number in circulation. Thus, if half of β components are deposited … then, the probability of deposit is reduced by one half. So that the entire process is self-regulating … α components may go on forever diminishing in amplitude, without consequence to the first law of thermodynamics.

The *"wave-function"* does not collapse … ever. It merely reduces its amplitude and the probability of causing another photon's absorption is only diminished.

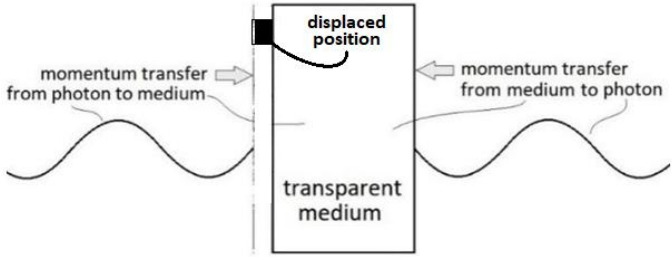
α Component Momentum Transfer

Upon meeting a target, the α-field component will be absorbed, reflected or will pass through the target. If absorbed, a β-component has been deposited and that part of the α-wave is destroyed at that place only … leaving a shadow behind the target.



If reflected, the α-wave is red or blue shifted representing a gain or loss of energy, which is given to or taken from the target object. Again, a shadow is left behind the target because that part of the wave is then traveling in the opposite direction.

If passing through, the α-wave will be slowed within the medium of the target, because it oscillates (interacts with) the masses of the particles therein contained. This slowing will impart momentum to the target and will displace its center of mass. Upon leaving the target, the α-wave will resume light speed and the target will stop moving, displaced by some infinitesimally small distance. If the target displacement is up or down a gradient, the α-wave will be blue or red shifted.



In each of the forgoing cases, the unaffected part of the α-wave will bend around to fill any gap caused by shadowing, or delay with attendant interference effects. The α-wave component has two possible adjustments to make for the purpose of rejoining behind a shadow or reflecting. Either the wavelength is changed and/or the amplitude is altered.

The β-wave components cannot be "*reflected*" in the manner of the α-component. Rather, it is absorbed and then re-emitted individually. This distinction means that an α-wave can be collimated, as in a searchlight, but β-components are re-emitted without reference to the surrounding particles. Hence, a mirror will not collimate re-emitted β-components. The β-components occupy space as a uniform "*sea*" of energy, in which each is a linearly localized waveform, traveling at velocity $10^{39}c$.

Underlying Cause of this Photon Model

In the present model, the charge of a particle is denoted by its deviation from the present unit density in the α-field. The conjecture is that the negative charge is the square root of the fine structure constant ... about 1/12th of unit density ... and the positive charge is about 2 minus a 12th or 1 and 11/12ths times greater than unit density ... so that, added together, unit density is conserved.

Therefore, when an electron vibrates ... one end of the vibration has a net compression or positive component, and the other end of the vibration has a net decrease in density or negative component. It is the alternating variance in local alpha field density, that is transmitted by means of the photon's alpha components. The midpoint of the electron's vibration is also its maximum velocity, requiring that it spins with its designated handedness at maximum rate. On the return, the electron has the same handedness but the direction of the corresponding twist in the alpha field (which is the magnetic component) ... is reversed.

Note here that the Standard Model does not accept a handed rotation of the electron, because it is believed that if one could overtake and pass an electron, that had previously passed the observer ... its handedness would change like a billiard ball, spinning with its angular momentum vector parallel or anti-parallel to the direction of motion.

Planck's Constant in e = n hf

The proposed walking wave in the α-field must carry 1/2 the kinetic energy of the photon and designates the probability of the β-field kinetic energy (the other ½) being deposited on a specific target. That is, the α-field determines the probability of absorption. The β-field ½-energy, is obtained from the uniform sea of β-field constituents, sequestered uniformly throughout space.

Though the velocity in the β-field is 10^{39} times light velocity, the energy contained in one photon β-component, when deposited on a target, is equivalent to beads on a string, with wavelength equal to the wavelength of the α-field wave, which determines the probability of its being intercepted by the target. That is, each piece will be deposited in the same time interval as would be the case if it were only travelling at light velocity. The number of beads on the string is the number 'n' in the equation … e = n hf.

Each kick given to the target by a *bead* imparts momentum to the target particle propelling it in the same direction ... like bullets hitting a small object. Momentum is conserved, so that the total energy given to the target, is equal to 'n' times Planck's constant and the frequency. Understand also, that the frequency of both the α and β components must be equal, for absorption to be possible at a given target.

Note: photon energy can be deposited on a target only if the frequency of the photon matches the de Broglie wavelength of the target particle.

If the γ (photon) = h/mc (target) , then the absorbed energy can be used to lift the particle up a potential gradient … or … be absorbed then re-radiated (re-emitted).

If not, the α-photon component is passed into the body of the material (transparency) … or … is *reflected* globally, by multiple targets as in a mirror (*not re-emitted*).

Reflections from Surfaces

Potential energy in the α-component, enables a reflected α-wave to alter the momentum of an object from which it reflects, by converting some of its potential energy into kinetic energy of the object, that reflects it (or gaining energy from it) ... while losing or gaining energy in the form of longer or shorter wavelength, depending on the frame of reference of an observer.

The reflection of the photon α-component is perfectly elastic, while the absorption of the β-component raises an electron out of its present orbital and is inelastic.

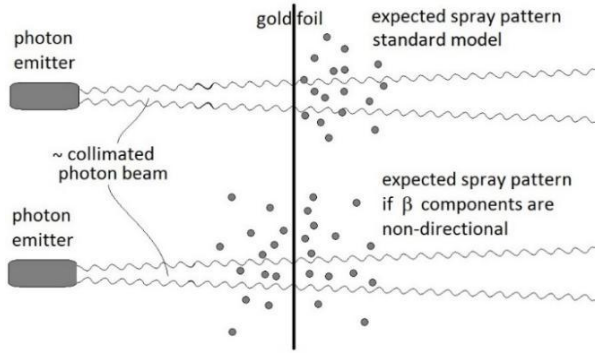
The transmission of the α-component through a medium is slowed, by the inertia of the charges it vibrates elastically while in passing. No potential energy is lost in transmission through a medium. Potential energy is lost only where the frequency of the alpha component is altered, as in reflection, which in turn imparts some kinetic energy to the medium.

Visible light has a wavelength on the order of 1000 times the distance between atoms in a crystal, making it comparable to a 1080p digital television, wherein each pixel is an atom, and the size of the tv is the wavelength of visible light. Therefore, the bumpiness of the reflected wave is minimal, and may smooth itself out again as the globally reflected wave proceeds. The α-component is *"self-repairing".* It will not carry a *"bump"* because of tension dynamics but will rather smooth it out.

The precedent for the α-component having potential energy, is that given as explanation for dark matter, where the α-potential energy was given as the initial surface tension analog. Allowing the α-field component of the photon to carry potential energy, removes any directional constraint that would disallow the deposit of a β-component, except from the same direction as the alpha component.

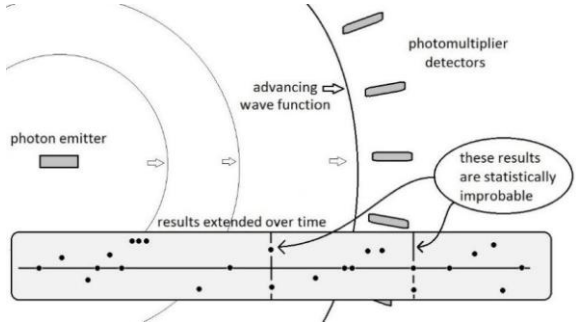
Two Experiments

Because momentum can be transferred directionally from the α-component's energy, the β-component can now hit a target illuminated by an α-field photon component from any direction. If this is so, an experiment wherein a very thin metal foil is irradiated by photons of sufficient energy to dislodge electrons, will show the emitted electrons distributed evenly around the target, rather than just in the rearward direction.



The model presented here leaves to experiment, whether the α-field component or wave function collapses when a β-component is deposited on a target. The wave function is here *conjectured* to go on, except in the localized area of an absorption, such that multiple β-components might be deposited at other places by the same wave function, if it does not in fact, disappear altogether, in the manner of standard model wave-function collapse.

This can be determined experimentally, with single photon trials, wherein several photo-multipliers are arrayed on an arc, whose radius has its origin at the source of the photons to be studied. If the wave function does not collapse, more than one photomultiplier will occasionally register a hit at the same time. If no multiple hits are ever seen, then ... the α-wave function must collapse entirely at a velocity of 10^{39} times light velocity (?).



Understanding the Photon … the difficulties

It is said that within the Standard Model, the photon is well-understood. It is not. There is no consistent geometric model of the photon that answers all experimental questions. Thus, several models are required to explain in geometric terms, observed phenomena. It is as though the photon has several faces to its identity. An example is the wave model, used to explain aspects related to radio transmission. Such a model is unsuccessful when applied to Feynman's stopwatch metaphor, which requires that the photon travel in the manner of a snake, rather than a wave.

Here is, perhaps, the origin of the fundamental difficulty in logic.

"*A thing is what another thing perceives it to be*"

This is a statement of congruency, i.e. "*being* & *perception*" or *"form & interaction"* are equal and simultaneous partners in the creation of existence. The one presupposes the other.

The universe forbids contradictions in place and time in this manner. An experiment conducted in another place in space (ignoring gravitational exceptions) must yield the same result. An experiment conducted at another time (small in comparison to the age of the universe) must yield the same result. Thus, absent some identifiable, causal reason … all experiments yield the same results when displaced to anytime and anywhere.

A conjecture proffered here is that the photon may in fact have no specific geometric identity … in principle. Here is what is meant by non-specific.

Suppose that the photon can be (as a model) the following:

1. A giraffe
2. A rubber ball
3. A butterfly
4. A book
5. A jagged rock

We conduct an experiment (type 1) and discover that the giraffe model fits the results best. Our photon has four legs and a long neck. Then … if we transfer our experimental setup to another place or time … it yields the same "*giraffe*" result, as required by logic.

Now we conduct another experiment (type 3) with a different experimental setup and discover that the photon is a butterfly. Transferring the setup to a different place and time results in the same "*butterfly*" result, as required by logic.

We do the same with other photon models and discover that they are all correct models of the photon, exclusive to the experimental setup designed to detect a different effect. All are transferable in time and space as the others … all are unique models. We expect the photon (a purely logical identity) to have a specific exclusive identity in geometry. But we have no right to expect this to be the true behavior of logic as displayed in geometry. The problem is the aforementioned congruency of "*being*" and "*perception*".

A different form of perception engenders a different form of being

That is, if we change our experimental setup (method of perception) … we alter the thing perceived (the form of its being). Thus, the photon may have no specific objective geometric form independent of its detection. We must always be mindful that the universe is not some "*stuff*" ruled over by logic … but is rather, logic itself. What we 'expect' to see is an orderly logical abstraction, i.e. logic embodied in geometry. Yet it may not be what we expect.

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