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Light and Photons in the Kinetic Model of the Universe

Abstract

Visible Spectrum in the Kinetic Model of the Universe
Light is information transported by Photons
Photons are Virtual pockets of momentum propagated by Aether

Description of Aether is on page 8

Recommended reading:

Wikipedia has a multipage entry for light, including a section listing the Theories of Light in Chronological Order throughout History. You will find the names of Giants and their contributions of the past four thousand years.

Visible Light

The spectrum of visible light was determined long before our ancestors have left the water to live on dry land. Water is transparent to visible light from wavelength of 200 nm to 900 nm. Vision was an evolutionary development for living things. Birds, bees, and most fishes can see the 200 nm ultraviolet photons. Humans and most mammals are good for seeing 400 nm to 700 nm range. By coincidence Earth's atmosphere is also transparent in the same range from 200 nm through near infrared. Wikipedia has diagrams in their section on Absorption by Water.

Light rays are very pervasive in our Universe. We find them everywhere. Every point in this Universe is a crossroad for millions of light rays. Consider the simplest of cameras that we have experimented with in our younger years: a darkened room or a black box with a pinhole in one wall and a display screen opposite the pinhole. The outside scenery is projected through the pinhole onto the display, rotated 180 degrees. Every ray of light from the outside travels through this pinhole and intersects the path of every other ray of light moving through this pinhole. The pinhole is a busy intersection.

To increase the complexity, imagine standing in your yard with your friends observing the trees. Every part of every tree sends photons in every direction and every person sees photons arriving from every direction. You can see how every point in your yard acts as a pinhole. A single ray of light from a flower to your eye crosses an infinite number of pinholes. In every pinhole that single ray of light crosses path with an infinite number of light rays from every other direction at a variety of angles. Still, we can observe clear pictures of flowers, trees and people without interferences or collisions with other photons.

In the Kinetic Universe light is a pressure wave function in Aether, propagating at the speed of c relative to the local Aether. Pressure waves carried by real particles with mass should satisfy the wave-particle duality of light. The speed of propagation c depends on the energy density of Aether. The mechanism is like sound waves traveling in gases. There are other similarities between sound and electromagnetic energy. High frequency sound waves are more directional than low frequency sound waves. Low frequency radio waves can bend around the horizon while high frequency TV signals require line of sight.

To see a picture, spatial order of light rays must be maintained. The pinhole mentioned above does that, but the picture cannot be viewed directly. To help us see, the eyes have built-in lenses. The lens has two purposes: It maintains the spatial order of light rays while reducing the size of the picture to fit the eye. The lens also helps with intensity.

Humans and most animals cannot see well a single ray of light originating from a single point. The lens of the eye collects many light rays from every point in our view. There is a light cone with thousands of light rays arriving to our eyes from every point in our view. The lens collects these rays in the light cone and directs them to a single receptor in the eye. In addition, there is this thing called resolution. We see light rays arriving from many atoms, molecules or structures as originating from a single point.

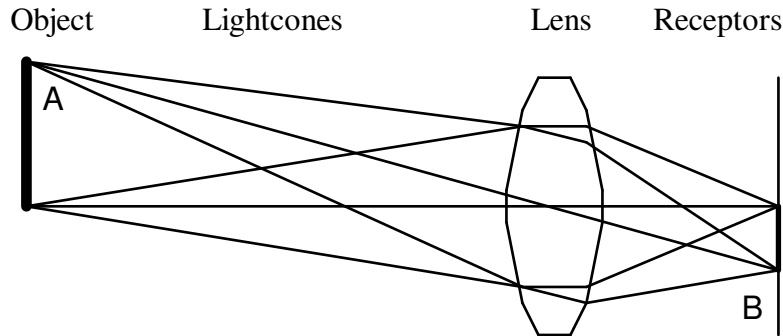


Figure 1. Receptors collect photons from light cones with a lens

A single light ray from point A on the object to point B in the eye contains a series of random photons. Light rays in the light cone combine to present a solid dot in the eye. One could speculate that the size of the lens in the eye is the result of evolutionary process. In the dark of the evening, we still get enough photons to combine into a solid dot in the eye to recognize objects. In bright daylight the pupil contracts to reduce the size of the light cone to limit the number of photons entering the eye. Night creatures have developed large eyes, large lenses.

Long distance light travel in the Universe has its own difficulties. There are large numbers of powerful light sources all around. We must consider all the pinholes a single ray of light has to traverse. With increased distance light from a single point disperses to a larger area and becomes weaker, but with increased distance objects 'become' smaller and because of resolution, we receive light rays from more points to the same receptors. Within limits brightness stays the same at the expense of resolution. When the photons arriving from a distant star have large gaps between them, the star will twinkle in our eye. A telescope will collect more rays from a larger light cone and the twinkle will disappear.

Photons do not slow down and do not get tired in their long-distance travel because the energy of the local Aether keeps them replenished, young and perky.

At this point I must disappoint you. There is nothing electric or magnetic about light or other 'electromagnetic radiation'. Light is a mechanical, kinetic process. Light is information transported by Photons.

Photons are described in a follow up publication: Photons in the Kinetic Model of the Universe. For your convenience I have attached it to the end of this paper.

A ray of light is a misnomer. Photons travel alone, unrelated to other photons. Each photon carries its own information of frequency and direction. More photons in the light-cone mean stronger signal for the receptor. A beam of light could carry serial information, like in an optical fiber. Bulk light is random source and direction of photons used for area illumination. For transmission of Pictures, the spatial position of light cones must be preserved from source to destination even through reflections and refractions. Think of periscopes, telescopes, binoculars, or your dresser's mirror.

Chances are high that our Universe is colorless. Photons have no color, only frequency information, polarization, and direction. Colors are created in the brain from information received from light-cone receptors in the eyes. The colors you see may not be the same colors I see or the blue jay in your yard sees. Some people do not see all colors beside shades of gray.

Light

Visible light is a small part of the spectrum of Photons. Momentum carrying Photons are involved with frequencies from Ultraviolet to Infrared and beyond.

Vision is a subject beyond the scope of this document.

Solitons and Photons.

The soliton phenomenon was first described in 1834 by Mr. John Scott Russell. He observed a solitary wave in the Union Canal in Scotland. Mr. Russell reproduced the phenomenon in a wave tank. And you can read the full story in Wikipedia. The theory of solitons is an active field of mathematical research.

The property of solitons we are most interested in is that solitons can collide with other solitons or small objects, and emerge from the collisions unchanged, except for a phase shift.

In the context of our Kinetic Universe, Solitons are energy packets, we call Photons. A Photon is a virtual sphere or ellipsoid of Aether, one-half wavelength in diameter. Within this virtual sphere of Aether is a pressure wave moving at the speed of light. Photons are always moving at the speed of light. There are no photons at rest. We are familiar with sound. Sound pockets move with the speed of sound. There are no sound packets at rest

Photons are large compared to atoms and molecules and compared to the distances between those atoms and molecules. A green photon's diameter of 250 nm would span about seven hundred atoms of most matter. This large relative size of Photons makes proper reflections and refractions of individual Photons possible for use in mirrors and lenses.

The volume of the 500 nm green photon is the volume of a ball 250 nm in diameter, more for ellipsoids.

$$\text{Volume of 500 nm Photon} \quad V = \frac{\pi}{6} \times D^3 = \frac{\pi}{6} \times (2.5 \times 10^{-7})^3 = 8.18 \times 10^{-21} \quad m^3$$

In a previous paper we calculated the density of Aether to be twenty milligrams per cubic meter. The mass of Aether in a 500 nm green photon would be:

$$\text{Mass of 500 nm Photon} \quad m = 8.18 \times 10^{-21} \times 20 \times 10^{-6} = 1.636 \times 10^{-25} \quad kg$$

This Mass of the Photon is a virtual Mass. The mass belongs to Aether.

A source injects Momentum into Aether to create a Photon. The Photon relies on the Aether of the Universe to carry this Momentum forward at the speed determined by the density of Aether. Reflecting surfaces preserve this Momentum. The virtual sphere Photon interacts with the surrounding Aether to keep the Photon moving forward with the speed of light until the Photon is absorbed.

Polarization of light flattens the virtual sphere of the Photon but keeps the width of the resulting ellipsoid. Polarization is temporary.

Collision of a photon with other photons, atoms and molecules will change the speed of photon during the encounter, but after the collision the Photon reassembles itself and continues its travel in the original direction at the original frequency with the proper speed.

Photons are created by the Sun, electric lamps, fires, and other energetic sources. Phonons with their synchronized movement of local atoms are also a source of Photons.

The realm of photons extend from X-rays to Radio Waves. An electrical engineer knows that radio frequency energy can escape from a device through a narrow slit of at least one-half wavelength. These are also Photons, large ones.

Photons

The Photon has many secrets. We know the density of Aether, but we must better understand the size of the individual Aethons. These tiny particles with mass move at the incredible speed of $1.5 c$ in random directions and collide with each other. There must be other interactions to keep Photons moving for billions of years in a straight line. For now, we know these properties:

Each Photon carries its own basic information of frequency and direction. Color or frequency is determined by the size of the photon. Speed of travel of photons is determined by the energy density of the local Aether.

Reflection is a mechanical event on a smooth surface larger than the photon. Imagine a bouncing ball in a gravity free environment. A 500 nm green photon's diameter is 250 nm; it spans over 740 molecules of water, or 685 molecules of SiO_2 . That works out to 430,000 water molecules and 371,500 SiO_2 molecules in the cross section of this 250 nm diameter green Photon.

Transmission through glass or other transparent matter depends on the packing density of atoms in that substance. When a Photon (soliton) encounters an atom or molecule, it envelops the obstacle and goes around it. The inherent speed of individual Aethons do not change. Reflections and bouncing by Aethons preserve the momentum of the impeded Photon; it takes extra time for the Photon to make progress across the obstacle. But frequency and direction information carried by the Photon is preserved. Quantum fans should be delighted.

Diffraction. If a photon enters a glass surface at an angle, the photon will change direction due to the reduced speed within the glass to preserve its own physical integrity. Smaller Photons with their higher frequency travel slower in denser matter, resulting in a larger angle of diffraction, creating the rainbow effect if traveling with other photons of assorted sizes. I am counting on the experts to work out the details.

Reflection, transmission, and diffraction are described in detail in Wikipedia, and we will not repeat them here. Just replace the word wavefront with the word photon.

Other Photon facts: A photon carries information of a single pixel. Higher frequency photons have smaller diameter, resulting in better resolution of images. Think of semiconductor manufacturing, where ultraviolet light, x-ray and above help to reduce feature sizes. Lower frequency photons are larger, more robust. They may travel farther by better surviving clouds, dust, and other obstacles. The new Webb Space Telescope uses the infrared spectrum to make observations in deep space. The size of an infrared Photon could be ten to hundred times the size of a visible Photon. The difficulty is that everything emits infrared photons at normal temperatures. The solution was to operate the Telescope Optics at very cold temperatures to reduce the background noise.

Redshift of light coming from faraway Galaxies could be caused by expansion of the Universe, or expansion of individual photons to lower frequencies: expansion of blue photons into green, yellow, or red photons.

I am overwhelmed by the number of Photons bombarding us from every direction. We can look at a picture from any angle and realize that every point on that picture emits photons in every direction possible. Every Photon cross path with many other photons at a variety of angles without damage. Then I realize that visible photons are a small part of the spectrum.

Preliminary Aether Data

Aether is a monatomic super-gas consisting of tiny balls of matter we call Aethons that fills every part of the Universe.

Imagine Helium Atoms under high pressure in a giant balloon, but three orders of magnitude smaller.

Density of Aether	20 mg / m ³
Pressure of Aether	1 terapascal
Average velocity of Aethons	1.5 c m/s
Mass of individual Aethons	2.696E-37 kg
Mass of Electron	9.109E-31 kg
Mass of Nucleon	1.674E-27 kg