

# A Possible Aether Explanation for Two Light Phenomena: Varying Speed with Medium and Cosmological Redshift

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## Abstract

The speed of light ( $3.00 \times 10^5$  km/s in a vacuum) lies beyond human comprehension, especially if one is to postulate that it can be achieved ballistically by a particle, even a “massless” one such as a photon. If such speeds are attainable, which experimentation and astronomical observation apparently have “proven,” then it is slightly less of a leap of faith to imagine such speeds to result from wave phenomena, suggesting that a propagating medium for light must exist (an “aether”) despite such allegedly having been disproven pre-Einstein. With this possibility in mind, two light phenomena are examined from the perspective of an aether as light’s medium of transmission.

## 1. Introduction

It is extremely difficult, if not impossible, to imagine any kind of particle, even an allegedly massless one such as a photon (ignoring its alleged relativistic mass) to be capable of ballistically speeding at  $3.00 \times 10^5$  km/s. Nonetheless, that is what mainstream physics would have us accept as gospel, with some wave-like properties thrown-in for good measure. It is almost as difficult to envision the same speed of a pure wave propagating through some sort of medium, such as an aether for light. Nonetheless, this would seem the only possible means of such speedy travel, and perhaps alternative concepts such as an aether consisting of “ropes” (Gaede’s intertwined electromagnetic “threads”) or standing waves could render the implausibility less difficult to imagine. (Reference 1 discusses theories of such “ropes” and standing waves, noting that, in the latter case, the required “tension” could be no more than a factor of about 50 below that for piano strings.) With this possibility

of an aether as light’s propagating medium in mind, two phenomena of light are examined from an aether perspective – its speed varying with medium and the cosmological redshift.

Note that no effort is made here to define the nature of the aether itself, other than to envision it as comprised of particles (“aetherons”), incompressible or perhaps slightly compressible of sizes that could be as small as the order of the Planck length (around  $2 \times 10^{-35}$  m). Only possible mechanisms for how such “aetherons” might behave in manifesting these two light phenomena are offered.

## 2. Two Light Phenomena

When light travels from one medium to another of different density, its speed changes, decreasing with increased medium density, as shown in Table 1 [1,2].

Material	Light Speed ( $\times 10^5$ km/s)
Vacuum	3.00
Air	2.99
Ice	2.29
Water	2.25
Glass	1.97
Diamond	1.24

Table 1: Speed of Light in Different Media

However, the “color” (frequency) of light does not change with medium, implying that the speed change arises solely from a change in wavelength, since “color” is a function solely of frequency, such that any change in speed must arise solely from a corresponding change in wavelength (since speed is the product of frequency and wavelength).

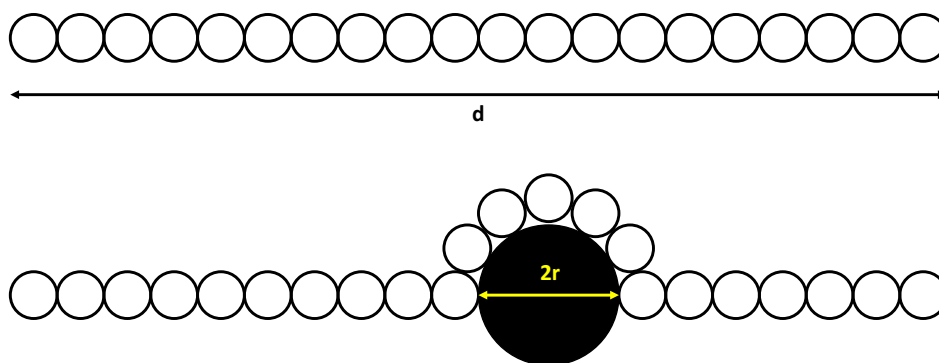
Cosmological redshift refers to the observed, roughly linear decrease in frequency of light emanating from galaxies as a function of distance (i.e., a shifting toward the “red” in terms of “color”), alleged by mainstream physics to result from the ever-expanding nature of space itself. In three dimensions, this is often likened to raisin bread rising as baked, with the raisins representing the galaxies in the “bread” of space. In two dimensions, this is likened to a polka-dotted balloon as it is inflated, with the polka dots representing the galaxies. “Tired light” advocates contend that this “reddening” results not from cosmic expansion but due to energy losses by the light itself as

it traverses the vast distances of space, often due to interactions with particles in the non-pure vacuum of intergalactic space. (For a comprehensive review of many “tired light” theories, see Reference 3).

Both of these phenomena are examined from the perspective of the existence of an aether as the medium of transmission for light. Despite the alleged “null” result from the Michelson-Morley Experiment, there has been ample evidence for the existence of at least a “dragged” aether around the Earth since neither the MMX nor subsequent more accurate experiments (e.g., Miller) yielded purely “null” results [3,4].

### 3. Light Speed vs. Medium

Figure 1 illustrates the concept of an essentially incompressible aether, consisting of a “string” of adjacent “aetherons” (spherical, for simplicity) arrayed linearly to represent a light ray spanning a distance “d” in a vacuum.



**Figure 1: Light Pulse Traveling Linearly through a Vacuum and Non-vacuum Medium from an Aether Perspective**

The top portion signifies a light pulse traveling at speed “c” over distance “d,” requiring a travel time of  $t_0 = d/c$ . In the bottom portion, the same light ray now travels through a non-vacuum medium composed of atoms of diameter  $2r$  (nuclear diameter, ignoring electrons since atoms are mostly “vacuum”). The light pulse, still traveling at “c,” must now cover a greater non-linear distance,  $d - 2r + \pi r = d + (\pi - 2)r$ , increasing the travel time to  $t_1 = [d + (\pi - 2)r]/c > t_0$ . Therefore, the light pulse, now traveling through a non-vacuum medium, is perceived as traveling at a slower speed over the linear distance “d” of  $v = d/t_1 < c = d/t_0$ .

Now, in Figure 2, this same light pulse is viewed as a series of waves, propagated via the adjacent aetherons. The top view shows the pulse through the vacuum, in this illustration comprising a total of seven wavelengths, spanning the distance

“d.” At the bottom, with the atom of nuclear diameter “ $2r$ ” now present in the non-vacuum medium, the light pulse must travel the slightly greater non-linear distance  $d + (\pi - 2)r$ , with a corresponding addition of approximately one-half wavelength (when passing “around” the nucleus) to cover the linear distance “d” (for illustrative simplicity, approximating  $\pi$  as equal to 3). Over the linear distance “d,” the equivalent wavelength of the light pulse through the non-vacuum medium has decreased by the ratio  $7/7.5$ , and the light speed, which is the product of frequency and wavelength, has also decreased by the same ratio, since the frequency (“color”) of light does not change when passing from one medium through another (it is frequency, not wavelength, that determines “color”). This decreased wavelength is also consistent with the phenomenon of light refraction when passing to/from a less dense from/to a denser medium.

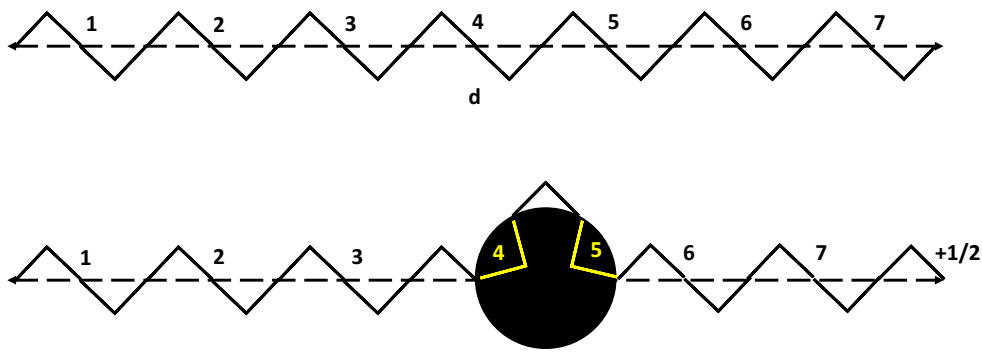


Figure 2: Light Pulse from Figure 1 Represented as a Series of Waves

#### 4. Cosmological Redshift

Cosmological redshift refers to the “reddening” of light from other galaxies, roughly as a linear function of distance. It is not applied to light emanating from within our own galaxy. This brings into question the many “tired light” theories that explain the reddening as light energy lost (i.e., a reduction in frequency [“color”] since light energy is the product of Planck’s constant and the frequency) via interactions with particles in a non-pure vacuum. Given the higher density (non-“pure”-vacuum nature) of intragalactic vs. intergalactic space, such “reddening” would

be expected from light emanating within our galaxy as well, not just from other galaxies. If we dismiss the mainstream explanation of “expanding space,” as well as the “tired light” theories requiring energy loss through interactions with particles, what might an aether perspective suggest?

Figure 3 illustrates a possible difference between intragalactic (top) and intergalactic (middle and bottom) aether that might explain cosmological redshift without either expanding space or tired light.

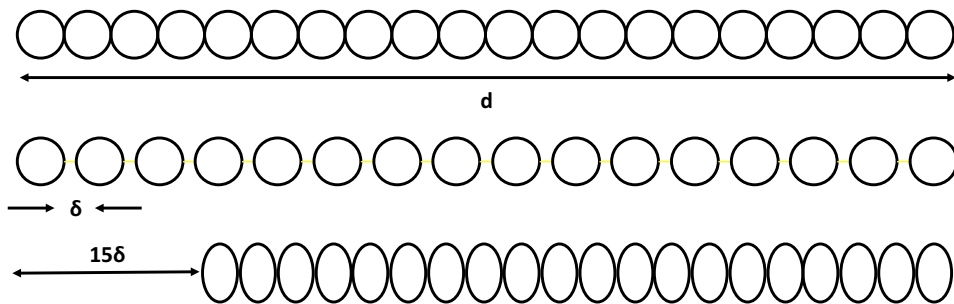


Figure 3: Light Pulse through Aether in Intragalactic vs. Intergalactic Space

At the top is shown a string of adjacent “aetherons” in an intragalactic vacuum (20 shown, no “attenuation”). Next (middle) is an “attenuated” string of nearly adjacent “aetherons” in an intergalactic vacuum (16 shown, with 15 interstitial spaces of distance “ $\delta$ ” between each, yielding a total space among them =  $15\delta$ ). Finally, at the bottom is an “attenuated” string of adjacent “aetherons,” now compressible, in an intergalactic vacuum (20 shown, with displacement =  $15\delta$ ).

In an intragalactic vacuum (top), a light pulse is transmitted across the distance “ $d$ ” with essentially no force required and no interstitial distance needing to be traversed; thus, the effective energy “lost” is essentially zero. In an intergalactic vacuum (middle or bottom), some force is required for the pulse to cover the interstitial distance, which totals a displacement of  $15\delta$  in this illustration, corresponding to some energy lost since energy (work) is the product of force and displacement. Since light energy is the product of Planck’s constant and frequency, any decrease in energy translates into a decrease in frequency, thereby yielding a redshift due to the “attenuated” nature of

the “aether” in an intergalactic vs. an intragalactic vacuum. (If light speed is assumed to remain at “ $c$ ” in both types of vacuum, then the wavelength will increase in proportion to the frequency decrease in the intergalactic vacuum. If the wavelength is assumed to remain constant in both types of vacuum, then the light speed will be  $< c$  in the intergalactic vacuum. Both are consistent with a redshift.)

Why might the nature of the aether differ between intragalactic (adjacent, incompressible aetherons) and intergalactic space (either non-adjacent incompressible aetherons or adjacent but compressible aetherons, either referred to as “attenuated”)? One can only speculate. Perhaps the gravitational or electromagnetic fields present with a galaxy vs. essentially absent (at least in terms of vanishing magnitude) between galaxies may play a part.

#### 5. Summary

Envisioning light to be capable of traveling ballistically at  $3.00 \times 10^5$  km/s in the form of a particle (photon), even one that is “massless,” would seem to stretch all credulity. And while

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envisioning this speed to be attainable even by a pure wave phenomenon is almost equally incredible, there is at least some plausibility to this being possible via a propagating medium such as an aether. Two light phenomena have been examined here from an aether perspective, speed varying with medium and the cosmological redshift, with explanations offered as to how both could be consistent with light propagating as a wave through an aether. Any effort to define the actual nature of the aether itself, other than to envision it as consisting of particles, incompressible or perhaps slightly compressible of sizes that could be as small as the order of the Planck length (around  $2 \times 10^{-35}$  m), is beyond speculation here. Only possible mechanisms for how such “aetherons” might behave in manifesting these two light phenomena have been offered.

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