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Light and Gravity Reconsidered Based Upon a Randomly Changing Aether of Space

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Abstract

Currently there is no explanation for the invariance of the speed of light in all frames of reference and there is no explanation for why black holes do not attract infinite quantities of energy and mass. A model of an aether is postulated that provides these explanations. In this model aether is composed of particles that, in the absence of mass, are disordered and chaotically changing in position and velocity. Within mass, the movement of aether particles is restricted, resulting in less disorder. This increased order extends beyond the boundary of the mass and tends towards disorder with greater distance from the mass. The greater the density of mass the greater the restriction in aether movement and the greater the order of the aether within and outside of it. Using this model and Einstein's equation for the deflection of light by mass, Snell's law for the velocity of light in different mediums, and Newton's law of gravity, a theory that is consistent with the constancy of the speed of light in all frames of reference and the fact that black holes do not attract an infinite amount of mass, is obtained. Moreover, calculations based upon these equations lead to the conclusion that the formation of light and gravitational waves both tend toward zero as the density of mass increases. This conclusion is consistent with the absence of light associated with black holes and the possibility that gravity could be eliminated by changing the properties of the aether.

Keywords: Newton's law of gravity, Speed of light, Gravity, Aether, Light, Space

Introduction

The failure of the Michelson-Morley experiment to detect a difference in the speed of light in any direction, led to the conclusion that no aether is involved in the propagation of light. Currently, the invariance of the speed of light is an unexplained fact. Michelson and Morley envisioned the aether to be uniform in composition and movement or stationery. The conclusion from their negative finding was that an aether did not exist. However, a different model of the aether is consistent with their negative result.

Let us postulate that the particles of the aether are in a state of chaotic change in position and velocity. If this were so, then the speed of light would not be dependent on its direction. In the absence of mass, the aether would be highly disorganized. In the presence of mass, the degree of disorder of the aether would be decreased by the restricted space within the mass. The greater the density of the mass the more order would be imposed upon it. Similarly, the increased order of the aether inside the mass would extend beyond its border and tend toward greater disorder with increased distance from the mass. Let us also postulate that light is formed by organizing the aether into an oscillatory pattern and that this occurs at a constant rate. If this were the case, then the speed of light would depend on its rate of formation which would be the

same in any direction as long as the properties of the aether were the same throughout the path of the light.

Transition of the aether from disorder to order due to mass: The speed of light in a vacuum was shown by Maxwell to be $c=1/\sqrt{\varepsilon\mu}$ where c = speed of light, ε = vacuum permittivity and μ = vacuum permeability.

It is well established that the greater the mass around which light passes the slower the velocity[1]. This delay is thought to be due to the curvature of spacetime with the speed of light remaining constant throughout[1]. However, given Maxwell's equation one must consider the possibility that the decrease in the speed of light is due to an increase in the product $\varepsilon\mu$. It is known that an increase in the density of a mass results in an increase in permeability[2] and in permittivity[3]. Such an increase would result in a reduction of the speed of light. Furthermore, Einstein showed that the deflection of the pathway of light by a mass is given by the equation,

$$\alpha = \frac{4GM}{dc^2} \quad (1)$$

α is the deflection angle which is the difference between the pathway the light would have taken had it not been deflected and the new pathway of the light.

G is the gravitational constant

M is mass

c is the speed of light

d is the distance between the light beam and the center of the mass

Using Snell's law, the velocity of deflected light is calculated.

$\text{Sin } \theta_1/\text{Sin } \theta_2 = V_1/V_2$

θ_1 is angle between the incident light that travels from a source to the mass and the Y axis.

θ_2 is the angle between the new direction of the light beam after passing the mass and the Y axis.

V_1 is the speed of light prior to entering the region of the mass and is equal to the speed of light in a vacuum = 299,792,458 m/s

V_2 is the speed of the deflected light

The increase in permittivity and permeability of space as the density of mass increases: Using the speed of deflected light the product $\varepsilon\mu$ given V_2 is calculated. This new εμ would exist in the vicinity of the mass. Below is a table of the change in angle of deflection that is calculated with respect to changes in mass. The distance, d, between the light beam and the center of the mass remains constant. Therefore, with an increase in mass there is also an increase in density, which would result in an increase in the permeability and permittivity within the mass and an increase in $\varepsilon\mu$. This increase in $\varepsilon\mu$ inside the mass extends outside of the mass and decreases with an increase in distance. Starting with the mass of the Sun, 1.9891 x 10^30 kg, and increasing mass while keeping the distance, d, of light from the mass constant we obtain increasing densities. The angle of deflection, speed of deflected light and $\varepsilon\mu$ at each density are shown in the table below. The incident angle is 45 degrees.

Angle of Deflection, Speed and $\varepsilon\mu$ with respect to Change in Density Obtained by increasing Mass while Distance of Light Pathway from the Center of Mass Remains Constant

Mass/ Log Mass(kg)	Angle of deflection (arcseconds)	Speed of light (m/s)	$\mu_n\varepsilon_n$/ Log$\mu_n\varepsilon_n$
0	0	299,792,458	1.1126501 x 10^{-17} -16.9536413887
1.9891 x 10^30 30.2986566174	1.75	299,789,914.476	1.1126689 x 10^{-17} -16.9536340507
1.9891 x 10^31 31.2986566174	17.501897009	299,767,019.033	1.1128389 x 10^{-17} -16.9535677017
1.9891 x 10^33 33.2986566174	1750.1897009	297,237.907.612	1.1318571 x 10^{-17} -16.9462084005
1.9891 x 10^34 34.2986566174	17501.897009	273,306,508.106	1.3387518 x 10^{-17} -16.8732999322
3.9782 x 10^34 34.5996866131	35003.7940179	244,853,985.247	1.667960 x 10^{-17} -16.7778143686
7.9564 x 10^34 34.9007166087	70007.5880358	182,880816.793	2.9899484 x 10^{-17} -16.5243363066
15.9128 x 10^34 35.2017466044	140015.176072	45,103,344.4418	4.9156676 x 10^{-16} -15.308417492
16 x 10^34 35.2041199827	140782.440372	43,534897.7371	5.2762449 x 10^{-16} -15.2776750546
17 x 10^34 35.2304489214	149581.342895	25,510,478.8733	1.5366069 x 10^{-15} -14.813437221
18 x 10^34 35.2552725051	158380.245418	7,439,644.81293	1.8067397 x 10^{-14} -13.7431044125
18.2 x 10^34 35.260071388	160140.025923	3822800.72354	6.8428447 x 10^{-14} -13.1647633163
18.4 x 10^34 35.264817823	161899.806427	205,678.378972	2.3638653 x 10^{-11} -10.6263772745
18.405 x 10^34 35.2649358218	161943.80094	115249.031361	7.5287943 x 10^{-11} -10.1232745684
18.4055 x 10^34 35.2649476199	161948.200391	106206.09686	8.8654565 x 10^{-11} -10.0522988968
18.407 x 10^34 35.2649830123	161961.398745	79077.2910286	1.5991766 x 10^{-10} -9.79610357367
18.411372 x 10^34 35.265086153	161999.867547	272.252	1.35 x10^-4 -3.700
18.4113722 x 10^34 35.2650861577	161999.869483	268.273	1.39x10^-4 -3.856
18.41137232 x 10^34 35.2650861605	161999.870363	266.465	1.408x 10^-4 -3.851
3.8011079 x 10^37 37.58	161999.999999 99	2.058 x 10^-5	2,361,358,995.9

Effect of the increase in permittivity and permeability on gravity: From this table it is seen that as the density of mass increases there is a decrease in the speed of light that approaches zero. One interpretation is that the speed of light formation approaches zero. This concept leads to the idea that when light is directed to a black hole it is not absorbed and unable to escape. Instead, it is no longer formed in a region of extraordinarily high $\varepsilon\mu$. This concept explains why black holes do not acquire infinite energy from absorbing light that enters them but does not escape. The light does not enter the black holes. Instead, the light is no longer formed.

Another unresolved question has been, given their massive gravity why don't black holes absorb all of the mass around them? This question can be addressed by substitutions among the equations below.

1. $\alpha = \frac{4GM}{dc^2}$
2. $M_1 = \frac{\alpha_1 d_1 c_1^2}{4G}$
3. $M_2 = \frac{\alpha_2 d_2 c_2^2}{4G}$
4. $c_1^2 = \frac{1}{\mu_1 \epsilon_1} \qquad c_2^2 = \frac{1}{\mu_2 \epsilon_2}$

Substitute the above equations into Newton's equation where F_g = force of gravity.

5. $F_g = \frac{GM_1M_2}{r^2}$
6. $F_g = \frac{G(\alpha_1 d_1 c_1^2/4G)(\alpha_2 d_2 c_2^2/4G)}{r^2}$
7. $F_g = \frac{(\alpha_1\alpha_2 d_1 d_2 c_1^2 c_2^2/16G)}{r^2}$
8. $F_g = \frac{\alpha_1\alpha_2 d_1 d_2}{16G\, r^2(\mu_1\epsilon_1)(\mu_2\epsilon_2)}$

Referring to the table one sees that as the density of mass increases the limit of $\underline{\alpha}$ approaches 45 degrees. $d_1\, d_2 /16Gr^2$ remains constant as density increases. At large density,$(\varepsilon_1\mu_1)$ $(\varepsilon_2\mu_2)$is also large. When $(\varepsilon_1\mu_1)(\varepsilon_2\mu_2)$ is large then F_g is small. This is contrary to the current concept. But it does explain why all mass is not consumed by black holes.

Referring to the table one sees that at some point beyond the density (mass/volume) of 18.4113722 x 10^34/volume, the product $\varepsilon_n\mu_n$ increases greatly**.** Simultaneously, there would be a precipitous decline in the force of gravity, F_g.

Continuity of properties of space inside and outside mass: The definition of vacuum permittivity is a measure of the polarizability of the aether. The definition of vacuum permeability is the magnetization that the aether obtains when it is subjected to a magnetic field. As the density of a mass increases both permittivity and permeability increase. An increase in permittivity and permeability is indicative of increased polarization and magnetic flux within the mass. This increased structural order results in an increase in the organization of the aether within the mass. The aether within the mass is continuous with the aether outside of it. Therefore, we may posit that an increase in the density of a mass results in an increase in εμ both inside and outside the mass. In the case of water, permittivity[4] and permeability[5] may decrease with increasing temperature due to increased disorder. Similarly, if in the absence of mass and energy, the aether moves chaotically or has another property that changes chaotically then an increase in ε and μ is consistent with greater order of the aether.

Conclusion: Initially, in 1905 Einstein published his theory of special relativity in which an aether played no role. However, in 1915 Einstein introduced his theory of general relativity that explained gravity to be a result of the curvature of spacetime by mass.[6] That, Einstein considered spacetime to be an aether is shown by the statement that he made in 1920,

"Recapitulating, we may say that according to the general theory of relativity space is endowed with physical qualities; in this sense, therefore, there exists an ether. According to the general theory of relativity space without ether is unthinkable; for in such space there not only would be no propagation of light, but also no possibility of existence for standards of space and time …"[7]Neither special nor general relativity provided an explanation for the constancy of the speed of light. Such an explanation is provided by postulating a randomly changing aether. Light is formed from the aether, and its formation occurs at the same rate regardless of the frame of reference. This is the basis for the invariance of the speed of light. The greater the density of mass the greater the order of the aether inside and outside mass. Consequently, the greater the density of the mass the greater the permeability and permittivity of mass and the aether around it. The greater the order of the aether the slower the speed of light. Also, when the density of a mass is such that the speed of the formation of light approaches zero the force of gravity is also greatly diminished. This is consistent with the fact that black holes do not attract an infinite amount of mass. Why the speed of light is invariant is not explained by the concept of aether as spacetime. But a model of a chaotically changing aether does. In this paper a conceptual framework encompassing gravity and light has been proposed. The possibility of significantly reducing gravity by increasing εμ also has been revealed. Further work with this model of the aether could lead to a theory that unifies the four fundamental forces of nature.

Conflicts of Interest: None

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