The aberration of light doesn't negate the aether drag hypothesis

- New possibility of existence of aether -

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Abstract

Aether was widely believed to be the medium of light that fills the universe. However, the Michelson-Morley experiment failed to detect the aether wind that should have been observed if the Earth was moving through the aether, so the existence of aether was not proven, and aether is now considered an obsolete physics theory. At that time, one of the hypotheses to explain the existence of aether even without the aether wind was the aether drag hypothesis, which proposed that the aether moves with the Earth. However, this hypothesis was rejected because it could not explain the aberration of light. Consequently, modern physics has progressed and developed on the premise that aether does not exist. Here I show that the aberration of light can be explained even if aether moves with the Earth. I clarified that the flowing aether does not receive light directly from above, but receives it from an upward diagonal forward angle according to the same principle as the aberration of light and transmits it linearly. This means that, for an observer on Earth moving at the same speed as the aether, the direction of light matches the direction observed in the aberration of light. This research finding strongly suggests the possibility of the existence of aether. Therefore, when I calculated the angle at which light from a star is bent by the gravity of the sun during a solar eclipse, assuming the existence of aether, it matched the value calculated by the theory of relativity. From now on, I propose that various physical phenomena should be reconsidered assuming the existence of aether.
This paper is a rewrite in English of a Japanese paper originally publishde in 2012, with new findings added.

Introduction

Important conditions for a good physics theory are that it is simple and easy to understand, and that it has the versatility to explain multiple phenomena[1,2]. However, in modern physics, especially in the theory to unify the theory of relativity and quantum mechanics, as the field advances, more and more difficult theories are being created to explain things that could not be explained by previous theories. The current leading candidate for this theory is superstring theory[3], which claims that elementary particles are not "particles" but actually "strings," and that our world is not four-dimensional (time and space combined) but has 10 or more dimensions, making it a theory that is complex, difficult and difficult to understand with common sense. I am concerned that the reason for this is that both the theory of relativity and quantum mechanics assume that aether does not exist as a medium of light.
Until the beginning of the 20th century, it was widely believed that light is a wave and that the universe is filled with aether, the medium of light[4,5]. However, in the Michelson-Morley experiment[6,7] conducted in 1887 to prove the existence of aether, the aether wind

that should have been observed if the Earth was moving through the aether could not be detected, which resulted in the existence of aether being questioned. At that time, people who believed in the existence of aether considered various hypotheses to explain that aether exists even if the aether wind was not observed. One of these was the aether drag hypothesis[8], which suggested that the aether is attracted to the Earth by its gravity and moves along with the Earth. However, the aether drag hypothesis was denied because it could not explain the aberration of light[9] observed at the time. As a result, it was strongly suggested that aether does not exist, and modern physics was forced to assume that aether does not exist.

However, after reconsidering this by focusing on the angle of incidence of light seen from the flowing aether, it was discovered that the aberration of light occurs even if the aether is moving at the same speed as the Earth. This newly indicates the possibility of the existence of aether, and is a finding that could change the premise of physics. I will report the details below.

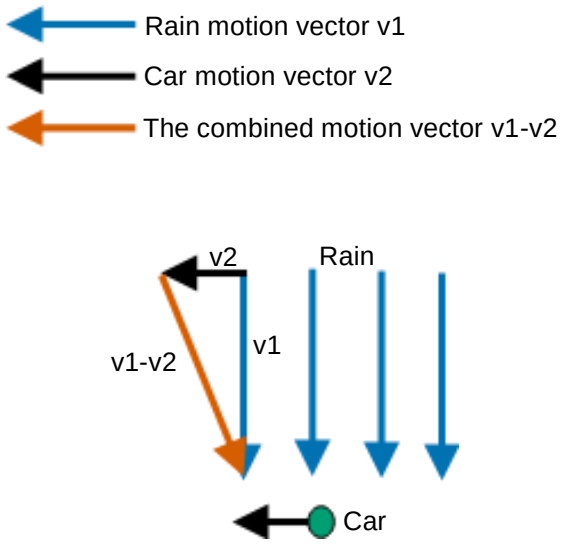
This paper is a rewrite in English of a Japanese paper originally publishde in 2012, with new findings added[10,11].

What is the aberration of light

The aberration of light is an astronomical phenomenon discovered by Bradley in the 18th century. Due to the Earth's orbital motion, the direction of light from stars appears to change, causing the positions of stars to appear to trace ellipse or circle depending on the season.

When driving through vertically falling rain, the rain looks like it comes from the front at an angle. This is because the motion of the rain falling vertically and the motion of the car moving forward are combined, changing the motion of the rain to a motion coming from an oblique angle in front of you (Figure 1).

Figure 1: Combination of rain and car motion.



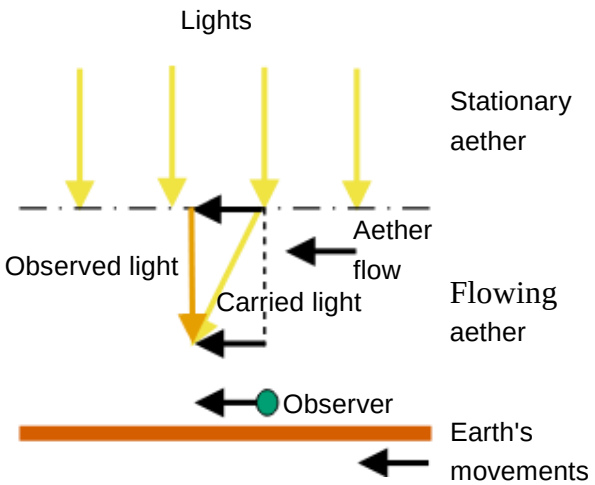
When a car is driving in rain falling vertically, the rain comes down from the upper oblique front as a motion vector of v1-v2, which is the combination of the motion vector of the rain and the motion vector of the car.

When this is replaced with light, rain is light from the star just above the solar system, the movement of the car is the revolution of the Earth, the vector falling from the upper oblique front where the motion vector of rain and the motion vector of the car are synthesized, becomes the light path to the earth. Because the earth is turning around the sun, the direction of travel of the Earth against the light falling from the stars varies with the season. As a result, the aberration of light occurs varies according to the season, and the position of the star appears to be shifted to draw a circle. This is the annual aberration.

Conventional thinking on the aether drag hypothesis and the aberration of light

Generally, it is thought that the aberration of light can't be observed if the aether moves with Earth. Specifically, light from stars is flowed at the same speed in the same direction as aether by the movement of aether. And Earth is also moving with aether. Therefore, it is considered that their motions cancel each other out and no change in the light path is observed to the observer on the Earth (Fig. 2).

Figure 2: Conventional thinking on the aether drag hypothesis and the aberration of light.



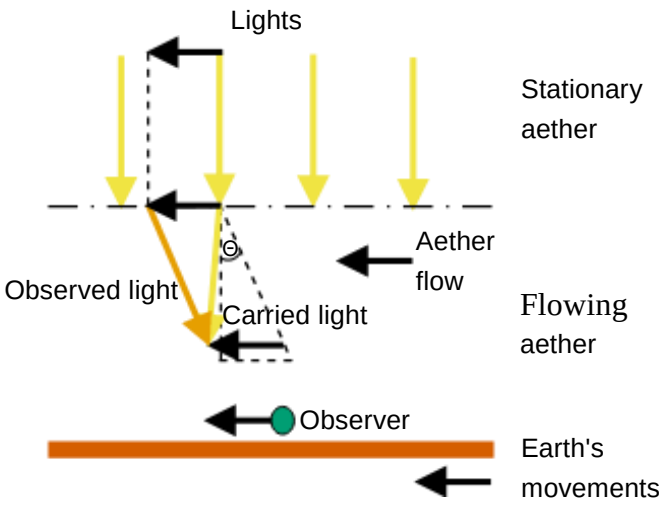
When light enters the flowing aether, light is flowed with the aether. However, at the same time the observer also moves at the same speed as aether, so it is observed that the light comes from directly above the observer. Therefore, the aberration of light is not observed.

New thinking on the aether drag hypothesis and the aberration of light

In a new way of thinking about the aether drag hypothesis and the aberration of light, attention was paid to the angle between aether and light when light enters the flowing aether from the stationary aether. Maxwell's equations[12] show that light, which is an electromagnetic wave, travels through space as the electric and magnetic fields alternately generate each other through electromagnetic induction, and that the vibration directions of the electric and magnetic fields are perpendicular to each other, and it travels straight through space as long as the permittivity and permeability do not change. In other words, when the aether receives light, it transmits it to the aether with the same

permittivity and permeability, which is 180 degrees opposite the direction in which it was received, repeatedly transmitting the light in a straight line. Light that has traveled straight vertically through stationary aether will appear to come from the upper oblique front when viewed from the flowing aether due to the same principle as the aberration of light. Then, the flowing aether that receives light from the upper oblique front transmits it to the aether that is moving together with it, which is 180 degrees opposite the direction in which it was received, oblique backward downward. Thus, the moment light enters the flowing aether from the stationary aether, the direction of travel of the light is changed by the same angle as the angle observed by the aberration of light. After that, the light traveling through the flowing aether flows in the same direction and at the same speed as the aether, but because the Earth is also moving with the aether, the movements of the two cancel each other out, and an observer on Earth sees the light traveling from an upward diagonal forward angle (Figure 3). For this reason, even when aether exists and moves with the Earth, the aberration of light is observed in exactly the same way as when the aether is not moving or does not exist. This shows that the aether drag hypothesis cannot be refuted by the aberration of light.

Figure 3: New thinking on the aether drag hypothesis and the aberration of light.



The angle at which the direction of light changes when it leaves stationary aether and enters flowing aether due to the same principle as the aberration of light, is denoted as θ, and the angle formed between the path of light carried by the aether and the path of light when it travels straight is denoted as θ′. (In Figure 3, θ′ is not shown because the speed of aether is much slower compared to the speed of light, making θ′ very small.)

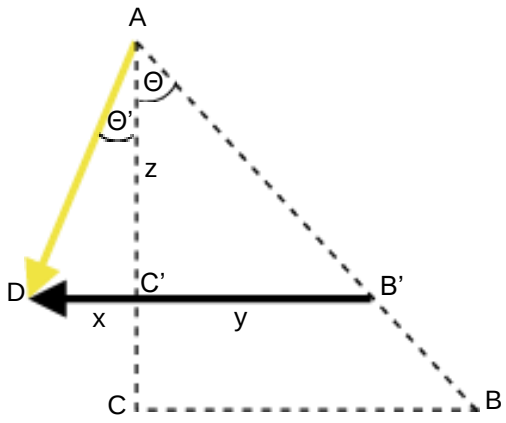
When the speed of the aether is slow and the angle (θ) at which the traveling direction of light is changed is small, then cosθ = 1. Therefore, the actual light goes straight because it is flowed back by the aether by the same distance that traveled backward due to the change in angle. When the speed of the aether is fast, let the angle between the path of the deflected light and the straight path of the light be θ', and the speed of light

being c and the speed of the aether being v, it results in Equation (1)

$$\tan\theta' = \frac{v\left(\sqrt{c^2+v^2}-c\right)}{c^2} \qquad (1)$$

Proof of Equation (1)

Figure 4: An enlarged view of the light traveling through the flowing aether in Figure 3.



Let the angle at which the traveling direction of light is changed be θ, and the angle formed between the actual path of light and the straight path of light be θ'. Let each vertex of the triangle be A, B, B', C, C', D. Let the line segment C'D be x, the line segment B'C' be y, and the line segment AC' be z.

In Figure 4, since the speed of light is constant relative to the aether, the light continues to travel at speed c even when entering the flowing aether. Therefore, the vector representing the light traveling through the flowing aether is not AB, but AB'.

Therefore,

AC = AB' = c

BC = B'D = v

AB = $\sqrt{c^2+v^2}$ (from the Pythagorean theorem).

Triangle ABC and triangle AB'C' are similar.

Therefore, $\frac{AB}{AB'} = \frac{BC}{B'C'}$ and $\frac{AC}{AC'} = \frac{AB}{AB'}$ (2)

From Equation (2),

$\frac{\sqrt{c^2+v^2}}{c} = \frac{v}{y}$ (3) and $\frac{c}{z} = \frac{\sqrt{c^2+v^2}}{c}$ (4)

From Equation (3),

$y = \frac{cv}{\sqrt{c^2+v^2}}$ (5)

From Equation (4),

$z = \frac{c^2}{\sqrt{c^2+v^2}}$ (6)

Thus,

$$x = B'D - B'C' = v - y = v - \frac{cv}{\sqrt{c^2+v^2}} = \frac{v\sqrt{c^2+v^2}-cv}{\sqrt{c^2+v^2}} \quad (7)$$

From the above,

$$\tan\theta' = \frac{C'D}{AC'} = \frac{x}{z} = \frac{v\sqrt{c^2+v^2}-cv}{\sqrt{c^2+v^2}} \div \frac{c^2}{\sqrt{c^2+v^2}} = \frac{v\sqrt{c^2+v^2}-cv}{c^2} = \frac{v\left(\sqrt{c^2+v^2}-c\right)}{c^2} \quad (8)$$

End of proof

Discussion

It turns out that the aether drag hypothesis can not be denied. Therefore, the existence of aether can not be denied, and the possibility of existence of aether was pointed out. Waves travel together as the medium moves. Thus, aether was thought to be stationary in space because light travels in a straight line through space, and it was thought that various celestial bodies moved through it without affecting or disturbing the aether. However, if the aether drag hypothesis is correct, we must consider that there is a flow of aether in the universe. This is also thought to have been one of the major factors that denied the aether drag hypothesis.

However, in Figure 3, observing the actual direction of light (carried light) shows that the light traveling through stationary aether continues to travel almost straight when entering the flowing aether. When light enters the flowing aether, it is carried along by the aether in the direction of the aether's flow. But at the same time, the moment light enters the aether, its direction of travel is changed according to the speed of the aether due to the same principle as the aberration of light, and it travels in the opposite direction to the flow of the aether. Consequently, both motions cancel each other out, and the light that has traveled through the stationary aether continues to travel almost straight when entering the flowing aether.

Strictly speaking, the distance the light is carried by the aether is longer. However, using Equation (1), it is calculated that the value of θ´ is 12.9 seconds when the speed of the aether is 5% of the speed of light, and 0.1 seconds when it is 1% of the speed of light. On the other hand, the orbital speed of the Earth is about 30 km/s, which is 0.01% of the speed of light, and the speed of the solar system orbiting the galaxy is about 220 km/s, which is 0.073% of the speed of light. In other words, the flow of the aether created by the dragging of the aether by the revolution and rotation of celestial bodies is very small compared to the speed of light. Therefore, even if light passes through the aether that is dragged by celestial bodies through space and moving at various speeds, it is thought that it will travel in a straight line just as it does when there is no aether or when the aether is stationary.

From the above, it has been found that the aether as a medium of light, the existence of which has now been pointed out, is significantly different from the conventional aether which was thought to remain stationary in space without interacting with other substances and being unaffected even when celestial bodies move through it. Instead, it is considered that they are not stationary in space, but are attracted by gravity and move along with celestial bodies, moving in various directions and at various speeds just as the Earth's atmosphere moves in various directions and at various speeds. And,

nevertheless, it has been found that it is possible to explain the aberration of light and the rectilinear propagation of light without any contradiction. From now on, I will call this new aether "neoaether" to distinguish it from conventional aether, and the theory that assumes the existence of neoaether "the neoaether theory".

On the other hand, it has been observed that light, which was previously thought to travel in a straight line through space, is now bent in the direction of gravity by strong gravity. In particular, during a solar eclipse, the angle at which the light from a star is bent by the gravity of the sun and the position of the star is observed to deviate from its actual location has been confirmed with high precision to be 1.75 seconds, which is predicted by the theory of relativity, twice the value calculated by Newtonian mechanics[13,14]. This is considered to be evidence of the distortion of space due to gravity proposed by the theory of relativity. Nevertheless, the bending of light due to gravity can also be explained by the neoaether theory. By the way, the neoaether around a celestial body is attracted by the gravity of the celestial body and moves toward the center of the celestial body, but this movement is offset by the movement of the neoaether that is also attracted by gravity on the back side of the celestial body and has passed through the celestial body, so it becomes a random movement and is stationary relative to the celestial body[15,16]. Therefore, the following explanation is for a space where the neoaether is stationary.

"If the medium of light is neoaether, then the electric and magnetic fields that compose light, which is an electromagnetic wave, are formed by neoaether. Neoaether is attracted by gravity, so they are inevitably attracted by gravity. As a result, light is attracted by gravity and bent. The angle of bending of light due to the gravity of the sun is very small, but it is determined by the distance that light travels toward the sun due to gravity. This distance is the sum of the distance that light is attracted by gravity, which is calculated based on Newtonian mechanics, and the distance that occurs when the direction of travel is changed due to the same principle as aberration of light at the moment that light is attracted by gravity and travels. The distance caused by aberration of light is equal to the distance that light is attracted by gravity. Therefore, the distance that light travels due to gravity is twice the value calculated by Newtonian mechanics. If the bending angle is denoted by θ, the value of $\tan\theta$ is proportional to the height, so if the distance that light travels due to gravity is doubled, the value of $\tan\theta$ will also double. The value of $\tan\theta$ is proportional to the angle when θ is small. Therefore, the bending angle is twice the bending angle calculated by Newtonian mechanics. The bending angle calculated by Newtonian mechanics is half the value calculated by the theory of relativity[13,17]. Therefore, the bending angle calculated by the neoaether theory is 1.75 seconds, the same as the value calculated by the theory of relativity."

The above explanation does not use the new concept that gravity distorts space, but uses only the conventional simple theory of wave properties and motion synthesis that have already been observed and widely accepted. Therefore, the result is the same as the theory of relativity, but it is much simpler and easier to understand than the theory of relativity.

Modern physics has progressed and developed under the assumption that aether does not exist. However, this time the possibility of the existence of aether has been pointed out.

From now on, in parallel with research into physics theories that assume the absence of conventional aether, I believe that it will be necessary to reexamine various physical phenomena based on the existence of neoaether, as has been revealed in this study.

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