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Relativity of Wavelength According to the Relative Velocity between the Observer and the Wave Source

Emad Y. Moawad*

Abstract

An observer on Earth can observe the path of the Moon and Earth around the Earth and the Sun, respectively. Both are elliptical orbits in which the Earth and the Sun are concentrated, respectively. But how do we accept both paths together, where one cannot imagine the Earth as stationary while the Moon revolves around it in one of them and at the same time the Earth itself is the one that revolves around the Sun in the other path! Two paths of the Moon and the Earth can be visualised together in the same frame, as the Moon revolves around the Earth, which in turn revolves around the Sun. So the Moon also revolves around the Sun in a wave path around the Earth. Accordingly, the path of the Moon that we observe in the form of an ellipse from the Earth is in the form of a wave motion whose axis is the Earth's path around the Sun when observed from the Sun. The two observed paths of the Moon's movement coincide in their estimated periodic time of 27.3216 days, while differing in wavelengths for each. The speed of the Moon along the elliptical path is 1023 m /s, while in the wavy path is 2.97×10^4 *m / s, which is the same as the Earth's speed around the Sun as both of them revolve together around it. The ratio of their wavelengths has been shown to be equal to* $[1023/(2.97\times10^4)]$*. Thus, the wavelength of the detected image is proportional to the relative velocity between the observer and the wave source (the Moon).*

Keywords: Wave motion, wavelength, relative velocity, periodic time, elliptical orbits

INTRODUCTION

The non-existence of absolute rest in the universe is responsible for the relative velocity of each event that varies with spacetime [1], and the effect of the relative velocity between the observer and the wave source (which causes the wave image) on the properties of the formed wave image is very clear [2, 3]. The effect of this fact is evident in carrying out experiments with moving bodies like playing Ping-Pong on the moving train; one would find that the ball falls vertically downwards like a ball on a table by the track. The Ping-Pong ball on the train bounces straight up and down, hitting the table twice on the same spot that moves with the train. To someone on the track, motion of the spot would be observed as the two bounces would seem to take place in different spots distant apart by the distance travelled by the spot with the train during the time between the two bounces.

Figure 1, shows the paths of the Ping-Pong ball as shown for two observers one on the train and other on the track [2].

Accordingly, the path of the Ping-Pong ball that seems vertical straight line to the observer on the train, also seems to another observer on the track - at rest with respect to the train - a curved path for a projectile falling down after reaching its maximum height with velocity roughly equivalent in

***Author for Correspondence**
Emad Y. Moawad
E-mail: emadmoawad@hotmail.com

Engineer, Ain Shams University, Cairo, Egypt

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magnitude and direction to that of the train. This clarifies the effect of the relative velocity between the observer and the Ping-Pong ball on the detected path of the motion.

On the train, there is no relative velocity between the observer and the train, which is the inertial reference frame of the Ping-Pong ball, whereas on the stationary station there is relative velocity between them. Despite both paths being for one motion, different in all physical quantities other than time, like position vectors, displacement, velocity, direction of motion, or both paths are correct and real relative to their observers. Another example of the effect of the relative velocity between the observer and the wave source (which causes the wave image) on the properties of the formed wave image, which is the paths of moons and planets which were predicted elliptical orbits by the theory of general relativity - which was roughly identical to that predicted by Newtonian gravitational theory [4]. For instance, the path of the Moon and the Earth around the Earth and the Sun respectively are traced from the Earth elliptical orbits in which the Earth and the Sun are concentrated as shown in Figure 2.

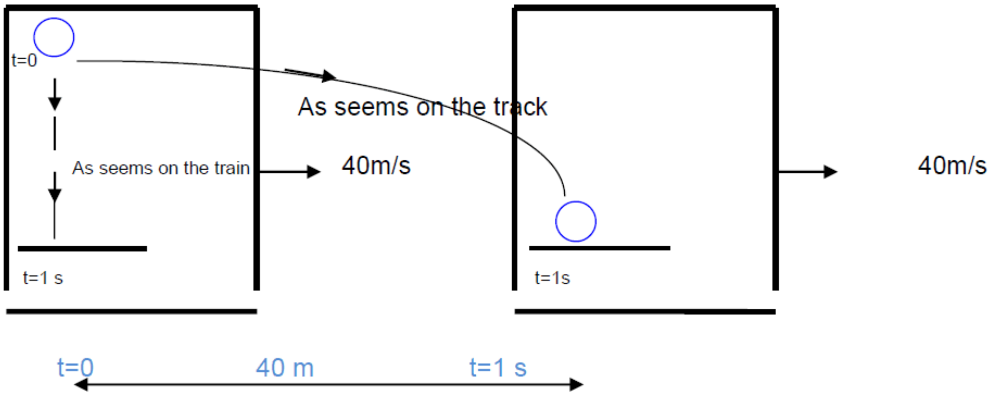

Figure 1. Path of the ping-pong ball as shown for two observers one on the train and other on the track.[2]

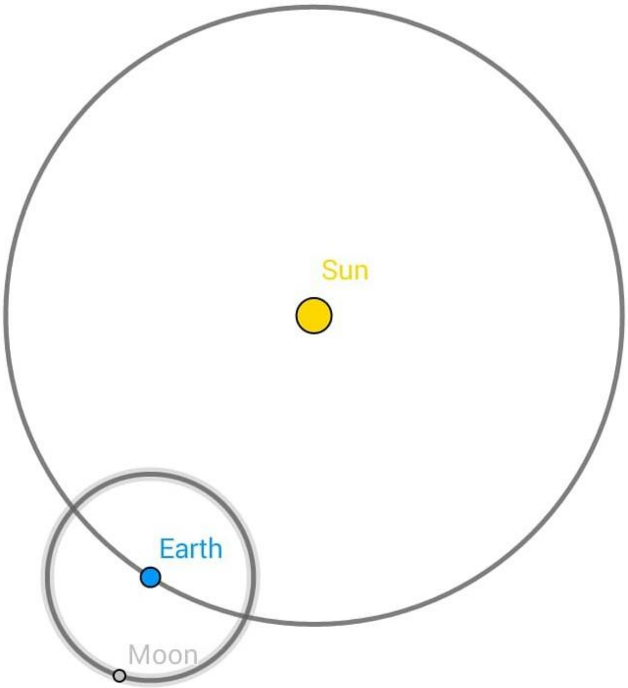

Figure 2. Shows the path of the Moon and the Earth around the Earth and the Sun, respectively as detected from Earth elliptical orbits in which the Earth and the Sun are concentrated.

But how do we accept both paths together, where it is not possible to imagine the Earth as static while the Moon revolves around it in one path and at the same time the Earth itself is the one that revolves around the Sun in the other path! These paths have been traced individually in the form of an ellipse by ignoring the fact that there is no absolute rest to observers and planetary positions because they cannot occur together at the same time. Either of the observer of the path of the Moon on the surface of the Earth or the observer of the path of the Earth from the Sun is like the passenger who observed the Ping-Pong ball from inside the train, where there is no relative speed between him/her and the inertial reference frame of the Ping-Pong ball which is the train.

Figure 3a shows the elliptical image of the path of the Moon (silver) with respect to the Earth (blue) as determined by the observer on the Earth [2, 3].

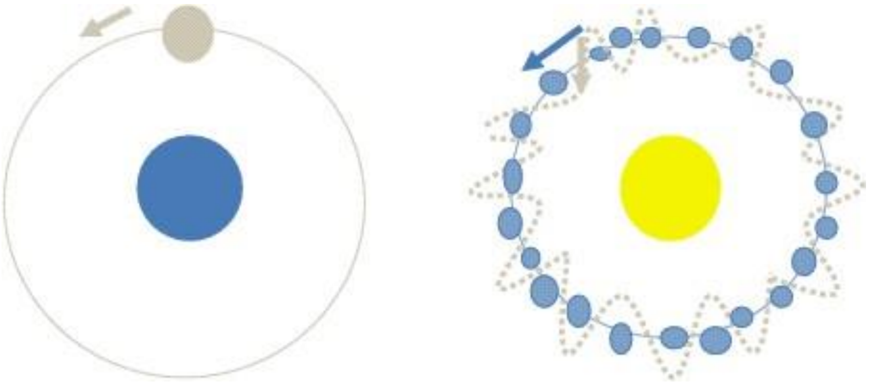

Figure 3. Elliptical image of the path of the Moon (silver) with respect to the Earth (blue) a) determined from the observer on the earth. b) determined by an astronomer her/his spaceship orbiting near the Sun [2, 3]].

Whereas if the Moon’s path is observed from the fixed point relative to the Earth which is the Sun, and also the Earth’s path is observed from the fixed point with respect to the Sun which is the Milky-Way, the two observations will be like observing the movement of the Ping-Pong ball from the stationary station with respect to the train. Thus, the two tracks of the Moon and the Earth can be visualised together in one framework; The Moon revolves around the Earth, which in turn revolves around the Sun. So the Moon also revolves around the Sun and that in a wave path around the Earth. That is, the path of the Moon that we observe in the form of an ellipse from the Earth is in the form of a wavy movement, the axis of which is the path of the Earth's movement around the Sun when it is observed from the Sun. Figure 3b shows the wavy image of the path of the Moon (silver) with respect to the Earth (blue) as determined by an astronomer her/his spaceship orbiting near the Sun [2, 3].

Also, despite both paths being for one motion differ in all physical quantities other than time, like position vectors, displacement, velocity, direction of motion, or….both paths are correct and real relative to their observers.

Thus, we should consider the fact of the relative image as the companion of the other fact of the nonexistence of absolute rest by taking into account the relative velocity between the source of the image and the observer. Current thesis clarifies the effect of the relative velocity between the observer and the wave source on the properties of the formed wave image.

PROOFS AND RESULTS

1st: Paths of the Ping-Pong ball as detected from inside the train and from the stationary station

Going back to the experiment shown in Figure 1, the Ping-Pong ball falls down and hits the spot in the train after 1 second, whereas the velocity of the train was (u=40 m/s). Thus, there was a relative velocity between the Ping-Pong ball and the passenger inside the train different from that between it and the observer on the stationary station. On the other hand, the two tracks of the Ping-Pong ball observed from inside the train and from the station were in the same period of time but they differ in their lengths.

Therefore, the length of both paths and the relative velocity between the Ping-Pong ball and the passenger on each path must be determined, to deduce the effect of the relative velocity between the observer and the wave source on the observed length of the path. The length of the vertical track is approximately the same height as the train, equivalent to (½ g × t^2) 4.9 m. The length of the projectile curve exceeds the length of the hypotenuse of the right triangle whose one side is the height of the train and the length of the other side equals the time of the free fall multiplied by the speed of the train.

Figure 4, shows the parabolic trajectory of the Ping-Pong ball that seemed to the observer on the track similar to that of a projectile after reaching the maximum height and falling down under the effect of gravity [2].

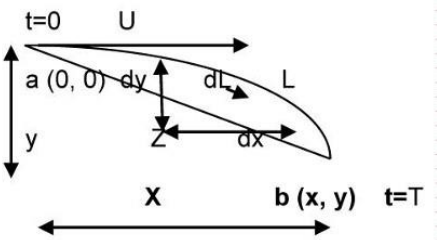

Figure 4. Shows the path of a projectile p of initial horizontal velocity u under the effect of gravity in interval T sec [2].

The Cartesian equation of the path of the Ping-Pong ball (projectile p) shown in Figure 4 is given by: $Y = \frac{g}{2u^2}X^2$ and $\frac{dy}{dX} = \frac{g}{u^2}x$, where x= ut, dx= u dt and y = 0.5 gt^2 and g is the gravity acceleration [5].

On the other hand, the arc length (L) of the path from point (a) to point (b) is given by

$$L = \int_a^b dL = \int_a^b \sqrt{(dx)^2 + (dy)^2} = \int_a^b \sqrt{1 + \left(\frac{dy}{dx}\right)^2}\, dx = \int_0^x \sqrt{1 + \left(\frac{gx}{u^2}\right)^2}\, dx = \frac{g}{u^2}\int_0^x \sqrt{\frac{u^4}{g^2} + x^2}\, dx \qquad (1).$$

While from equation 1 the arc length of the path from the initial to final positions is given by $L = \int_a^b \sqrt{1 + \left(\frac{dy}{dX}\right)^2}\, dX$ [6]. Then by substitution for $\frac{dy}{dX} = \frac{g}{u^2}X$, x= ut, dx= u dt, at x=a m t=0 sec and at x=b m t=T sec in equation 1 the arc length of the path along the period of T sec is given by $L = \int_0^T \sqrt{u^2 + g^2 t^1 dt}$ m.

As the Ping-Pong ball is seemed to the observer on the track to be projected horizontally by due to the relative velocity of the train (u=40m/s) to hit the spot in 1 sec then $L = \int_0^1 \sqrt{(40)^2 + (9.8)^2 t^2 dt}$ =40.397m. The increase of L (the path between two points on a curve) than the length of the line segment connecting the two points on the curve in Figure 4 [AB (40^2+ 4.9^2)^{½} =40.299 m], confirms that the Ping-Pong ball followed the proposed parabolic trajectory of a projectile in the observed image from the station. As in physics, the wavelength is the length of the straight line segment -but not the curve- connecting the two repeating points [7]. Accordingly, by regarding the motion of the Ping-Pong ball along either of the vertical and the curved path as a wave motion, the wavelengths of these wave paths are 4.9m and 40.299 m respectively [8]. On the other hand, the average velocity of the Ping-Pong ball at the middle of its vertical path was (g × ½ t) 4.9 m/s, which is the relative velocity between the observer inside the train and the Ping-Pong ball. While the average velocity of the Ping-Pong ball at the middle of its curved path was [$(40^2 + (9.8 \times ½)^2)^{½}$] 40.299 m/s, which is the relative velocity between the observer at the station and the Ping-Pong ball. Accordingly, the ratio between the wavelengths of the observed two paths of the Ping-Pong ball [(40.299 m) / (4.9 m) =8.244] is equivalent to the ratio between the relative velocities of the Ping-Pong ball in relation to the observers along these two paths [(40.299 m/s) / (4.9 m/s)= 8.224]. Thus, the wavelength of the detected image is directly proportional to the relative velocity between the observer and the wave source (the Ping-Pong ball).

I.e. Image of the straight path of a moving body in the absence of relative velocity between the observer and the inertial reference frame of the moving body is a curved path longer than the straight path in the presence of relative velocity between the observer and the inertial reference frame of the moving body. The ratio between the wavelengths of both paths is equivalent to that between the relative velocities between the observers and the moving body along these paths.

2nd: Paths of the Moon as detected from the Earth and the Sun

Figures 3a and 3b show the two paths along which the Moon moves as detected by two different observers. The first is the elliptical path of the Moon around the Earth as detected by an observer on the Earth. While the second is the wavy path (simple harmonic motion) of the Moon around the path of the elliptical path of the Earth around the Sun as detected by an observer near the Sun. The two observed paths of the Moon's movement differ in length but coincide in their time period estimated at 27.3216 days [9]. Also radius of the elliptical path is equal to the amplitude of the simple harmonic motion of the wavy path estimated at 3.844×10^8 m [9].

Figure 5 represents the wave function of the oscillator (Moon) with respect to the Earth as observed by the astronomer on the spaceship orbiting near the Sun [2].

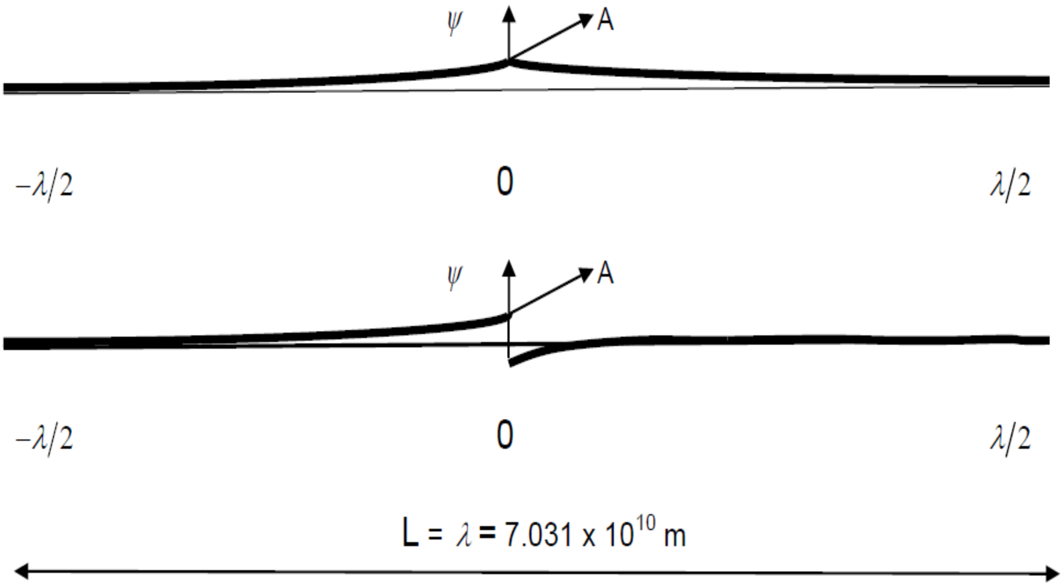

Figure 5. The quantum oscillator wave function of the Moon motion with respect to the Earth as observed from the sun [2].

The mathematical representation of the oscillator wave function (Ψ) that determines the position of the oscillator (Moon) with respect to the path of the Earth around the Sun according to the quantum physics for the simple harmonic motion at the ground state is given by $\Psi = \beta e^{-\left(\frac{mw}{2h}\right)X^2}$, where β =A

(Amplitude) at the normalisation condition (0, A) [10]. Thus, length of the wave function (L) is given by

$$L = \int_{-\lambda/2}^{\lambda/2} \sqrt{1 + \left(\frac{-m\omega}{h} AXe^{\left(\frac{-mw}{2h}\right)X^2}\right)^2}\, dX \text{ m} \qquad (2)\ [6].$$

By knowing the periodic time (T) and the amplitude (A) shown in Figure 5 of the simple harmonic motion of the moon which are 27.3216 d and 3.844 × 10^8 m respectively, m is the mass of the Moon (7.324 ×10^{22} kg) [9], $w = \frac{2\pi}{T}$, λ is the wavelength shown in Figure 5 and (h) is (6.62607004 × 10^{-34} m^2 kg / s) planck's constant, then (L) = 7.031 × 10^{10} m, equivalent to the wavelength (λ) of the oscillator to comply with the properties of the wave motion in quantum physics [7, 8]. Accordingly, speed of the Moon along the wavy path is (7.031 × 10^{10} m) / (27.3216 d × 86400 s) 2.97 × 10^4 m/s exactly as that of the Earth around the Sun [11], confirming what has been previously visualised about the speed the Moon on its wavy path with respect to the second observer.

On the other hand, the observer on the Earth determines that the Moon travels a distance of (1023 m/s × 27.3216 × 86400 s) 2.41488512 × 10^9 m on an elliptical path during the same periodic time according to the gravitational Newtonian theory.

Accordingly, the ratio between the wavelengths of the observed two paths of the Moon [(7.031 x 10^{10} m) / (2.41488512 × 10^9 m) ~ 29] is equivalent to the ratio between the relative velocities of the Moon in relation to the observers along these two paths [(2.97 × 10^4 m/s) / (1023 m/s) ~ 29]. This confirms once again that the wavelength of the detected image is directly proportional to the relative velocity between the observer and the wave source (Moon). Thus, the wavelength of the wavy image (λ) is longer than the length of the elliptical path of radius (r) by the ratio of the relative velocities between the Moon and the two observers on the Sun and the Earth respectively.

$$\lambda = \frac{V_{r.Sun}}{V_{r.Earth}} \times 2\pi r \qquad (3)$$

Thus, the path of the Moon around the Earth is detected as an elliptical path by an observer on the Earth, in the absence of a relative velocity between the observer and the inertial reference frame of the Moon, which is the Earth. While, in the presence of a relative velocity between the observer at the Sun and the inertial reference frame of the Moon which is the Earth, the path of the Moon is detected wavy of periodic time equivalent to that of the elliptical path. Along the elliptical path, the Moon travels with relative velocity of 1023 m/s with respect to the Earth [9]. While along the wavy path, the Moon travels as a companion of Earth with relative velocity 2.97 × 10^4 m/s with respect to the Sun [11]. Similar to the Ping-Pong ball that appears to the observer on the track to move slightly faster than the speed of the train (40.299 m /s). But unlike the Ping-Pong ball that appears to follow the path of a projectile to the observer on the stationary station, the Moon appears to follow a wavy path of an oscillator to the observer orbiting the Sun. Because the Moon doesn't falls down to collide with the Earth but maintains a constant distance from the Earth along its motion, and since both observers spend the same time to trace the path of the Moon, the periodic time and the amplitude of the wavy path are equivalent to the periodic time and the radius of the elliptical path.

I.e. Image of the elliptical path of an orbiting body around another body in the absence of a relative velocity between the observer and the other body, which is the inertial reference frame of the orbiting body, is a wave path of simple harmonic motion in the presence of a relative velocity between the observer and the other body. The ratio between the wavelengths of both paths is equivalent to that between the relative velocities between the observers and the orbiting body along these paths. When the relative velocity between the orbiting body and the observer

changes, the traced image of the path of the orbiting body would be changed as well to another relative image that has its own physical quantities.

Consequently, the nonexistence of the absolute rest in the universe is responsible for the relative images for every event so that no only one image of an event is available in the universe. Accordingly, the concept of the relative image should be taken into consideration in interpreting everything concerning the universe.

APPLICATIONS

1st: Paths of the Earth as detected from the Sun and the Milky-Way

As the two observed paths of the Moon’s movement like those of the Ping-Pong ball coincide in the periodic time, and different in the wavelength according to the relative velocity between the observer and the wave source as has been previously proven. Similarly, the paths of the Earth as detected by two observers from the Sun and the Milky-Way can be predicted to be elliptical and wavy paths respectively. The observer on the Earth or nears the Sun observes the Earth moves along an elliptical path around the Sun of radius 1.496×10^{11} m with velocity 2.97×10^4m/s, periodic time of 3.156×10^7 s and orbital length 9.39964×10^{11} m [11], in the absence of a relative velocity between that observer and the inertial reference frame of the Earth, which is the Sun. While in the presence of a relative velocity between the Sun and another observer on her/his spaceship orbiting nears the Milky-Way observes the Earth moves along a wavy path around the elliptical path of the Sun around the Milky-Way of amplitude (A) 1.496×10^{11}m at a speed equivalent to that of the Sun around the Milky-Way (i.e. $u = 2.2 \times 10^5$ m/s) [12].

Accordingly, the wavelength of the wavy path of the Earth around the elliptical path of the Sun around the Milky-Way observed by the observer at the Milky-Way is (λ = ut = 2.2×10^5 m/ s × 3.156×10^7 s) 6.9432×10^{12} m.

I.e. As has been proven, the wavelength of the wavy image (λ) is longer than the length of the elliptical path of radius r ($2\pi r$) by the ratio of the relative velocities between the Earth and the two observers at the Sun and the Earth respectively according to Equation (3).

(I.e. $\lambda = [(2.2 \times 10^5)\text{m/s}/(2.97 \times 10^4)\text{m/s}]\times 2\pi \times 1.496 \times 10^{11}\text{ m} = 6.9432 \times 10^{12}$ m).

2nd: Observational evidence confirms the relativity of wavelength according to the relative velocity between the observer and the wave source

Visibility with the naked eye differs from the surface of the Moon than on the surface of the Earth, and this has been evident since the Apollo flights to the Moon [13, 14]. As stars twinkle in Earth's sky, which can be captured from the Earth with visible light cameras, images captured from the Moon during the Apollo missions revealed the dark lunar sky, with only Earth and Venus visible [15]. This difference between the Moon and the Earth in the sensitivity of vision to visible light is due to the difference in their paths around the Sun [13, 14]. As verified above, the Moon moves in its wavy path, whose axis is the Earth's elliptical path around the Sun at a speed of 1.023 km / s in relation to the Earth and 29.7 km / s in relation to the Sun as a companion to the Earth in its rotation around the Sun. That is, the relative velocity between the Sun and each of the Earth and the Moon is constant and is 29.7 km / s, but in two different directions as shown in Figures 6a and 6b. Figure 6a, shows the wavy path of the Moon (dotted blue) around the elliptical path of the Earth (dotted black) with respect to the Sun and Sirius (dark blue).

(Elevation view)

While Figure 6b is a side view of the wavy path of the Moon around the Earth shows the Moon curving around the Earth along its wavy path forming a vortex (dotted blue) around the Earth, towards and against the direction of the rotation of the Sun and the stars (Sirius in blue) around the Milky-Way (dotted red).

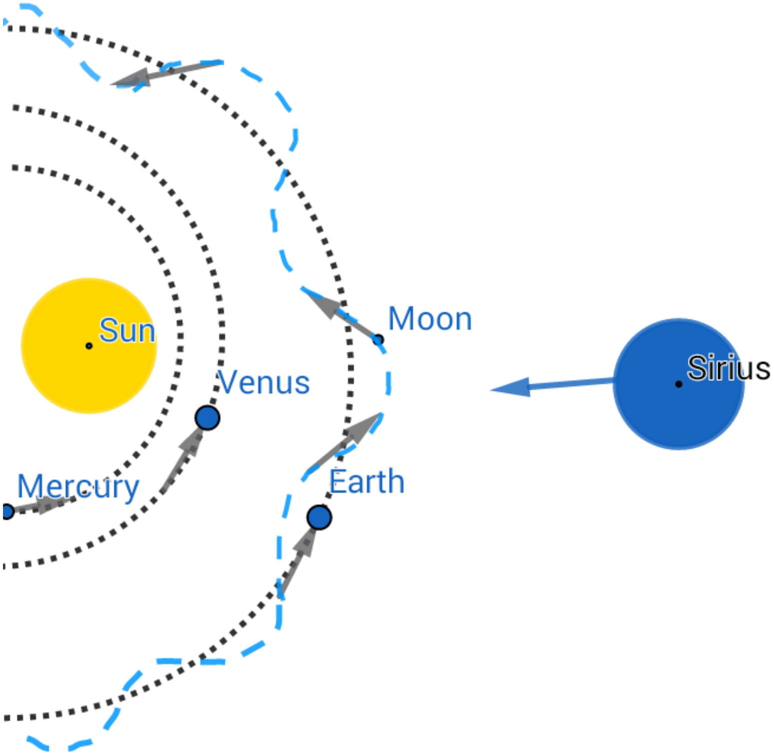

Figure 6. (a) shows the wavy path of the Moon (dotted blue) around the elliptical path of the Earth (dotted black) around the Sun.

(Side View)

Thus, the direction of the Earth's velocity along its elliptical path is perpendicular to both the sunlight and the velocity direction of the Sun and stars around the Milky-Way.

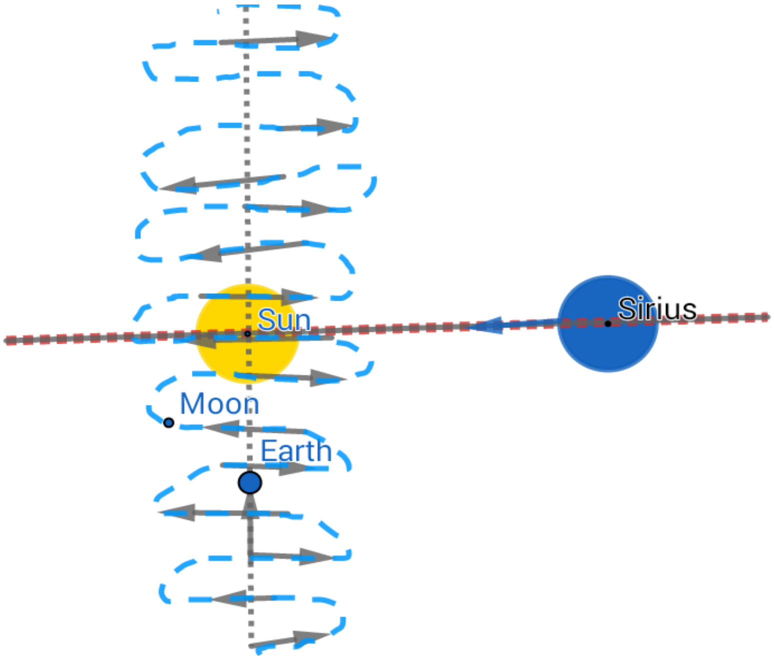

Figure 6. (b) is a side view of the wavy path of the Moon around the Earth shows the Moon curving around the Earth along its wavy path forming a vortex (dotted blue) around the Earth, towards and

against the direction of the rotation of the Sun and the stars (Sirius in blue) around the Milky-Way (dotted red).

While the direction of the Moon's velocity along its wavy path is in the direction of the velocity of the Sun and stars around the Milky-Way and opposite to that direction.

Accordingly, the difference in the relative velocity directions of both the Earth and the Moon with respect to the Sun also exists with respect to the close stars in the Milky-Way. Consequently, the detected wavelengths of the star's emissions by an observer on Earth is completely different from those detected from the same stars by an observer on the surface of the Moon. For instance, Sirius is a star larger than the Sun, the brightest star in the Earth's night sky and seen by the naked eye from the Earth [16]. It moves towards the solar system at a relative velocity of 5.5 km/s [7]. Thus, from Figure 6a, the direction of the Earth's movement, as detected from the Sun, is perpendicular to that of Sirius. Accordingly, the relative velocity between the Earth and Sirius is the same as between Sirius and the Sun (5.5 km / s). While from Figure 6b, the direction of the Moon's movement, as detected (also) from the Sun, is in the direction and opposite to the direction of that of Sirius. Accordingly, the relative velocity between the Moon and Sirius is (29.7 km / s - 5.5 km/s) 24.2 km / s when the Moon moves towards the Sun, and (29.7 km / s + 5.5 km / s) 35.2 km / s when the Moon moves away from the Sun. Thus, the ratio between the relative velocities of each of the Moon and the Earth with respect to Sirius is either [(24.2 km / s) / (5.5 km / s)] 4.4 or [(35.2 km / s) / (5.5 km / s)] 6.4. Consequently, as has been previously proven, due to such difference in the relative velocity between the Moon and the Earth with respect to the star Sirius, the detected wavelengths of Sirius emissions by an observer on the surface of the Moon is longer than those detected from Sirius emissions by an observer on the surface of the Earth by the same ratios of 4.4 or 6.4. Thus, the detected wavelengths of Sirius emissions in the visible light range starting from 380 nm on Earth are red-shifted to the near infrared region (1.672 μm or 2.432 μm) to be invisible on the Moon. Thus, it is impossible to see the twinkling stars in Earth's sky from the surface of the Moon. Such difference in the sensitivity of visibility between the Earth and the Moon confirms the relativistic wavelength according to the relative velocity between the observer and the wave source.

DISCUSSION

Before we discover the effect of the relative velocity between the observer and the source of the wave, one was wondering how to accept the fall of an object from the top of the tower to the bottom without colliding with the body of the tower despite its rotation with the planet around the sun at a speed of 29.7 km / sec. If it takes only 5 seconds for the body to free fall from the top of the tower to the Earth by gravity, then it is sufficient for the tower to move during this time at the speed of the Earth about 150 km while orbiting around the Sun, which confirms the impossibility of this vertical fall that was observed from the Earth itself! So there was a rejection of all observations that contradict what we know about the nature of the absence of absolute stillness in the universe. But now, in light of the above, about the effect of the relative velocity between the observer and the wave source on the wavelength of the observed path, as demonstrated in the current thesis in the experiment of the Ping-Pong ball that bounces inside the train. We can conclude that the existence of a relative velocity between the observer and the inertial reference frame of the wave source enables that observer to detect the path of the wave motion with respect to either of the observer and the inertial reference frame of the wave source. Like detecting the curved path of the Ping-Pong ball from the stationary station, the wavy path of the Moon from the Sun or the wavy path of the Earth from the Milky-Way. Similarly, the path of the free falling object from top of the tower with respect to the Earth can be detected in the presence of a relative velocity between the observer and the Earth. Thus, for instance, from a fixed point with respect to the Earth, which is the Sun, an observer detects the path of this free fall in the form of a projectile curve. The distance between the projection of the beginning and the end of the free fall is one hundred fifty kilometres, the distance covered by the Earth (inertial reference frame of the falling body) with respect to the Sun (observer). Current thesis deals with the movement of the Moon around the Earth that revolves around the Sun as an example of these observations that ignore the absence of absolute stillness in the universe. The inevitability of the path of the Moon's wave around the Sun, whose axis is the elliptical path of the Earth around the Sun, was deduced. By confirming the wavy path of the Moon, it has become clear that the Moon, unlike the Earth for which the Sun is stationary, moves in the direction and opposite to the direction of the velocity of the Sun and stars around the Milky-Way. The mathematical representation of the wavy path of the Moon around the Earth determines that the Moon oscillates in the direction and opposite direction of the rotation of the Sun and stars around the Milky-Way at the speed of rotation of the Earth around the Sun. Observational evidence has been presented in support of our hypothesis, which is the variation in the sensitivity of visibility from the Earth's surface compared to that of the surface of the Moon. And we realised the secret of the dark Moon sky that appeared in the pictures ofthe Apollo flights, which was devoid of stars, despite the appearance of the crescent of Earth, Earth rise and Venus in those pictures [17–19]. This is in contrast to the images of the Earth's sky where the stars illuminate the backgrounds. The star Sirius is one of the closest stars to the solar system which is visible by the naked eye from Earth but cannot be detected from the Moon. The relative velocity between the Moon and Sirius is 4.2 and 6.2 times higher than that between the Earth and Sirius, which redshifts the wavelengths of the Sirius emissions detected from Earth with visible light to be longer by the same ratio to the infrared region of the electromagnetic spectrum and becomes invisible. We now know why we can't see stars in the pictures of moonwalking astronauts.

CONCLUSION

The wavelength of the detected image is directly proportional to the relative velocity between the observer and the wave source.

The existence of a relative velocity between the observer and the inertial reference frame of the wave source enables that observer to detect the path of the wave motion with respect to either of the observer and the inertial reference frame of the wave source. Relative images of the same motion with a velocity less than the speed of light vary in wavelength and velocity of motion but have the same observation time according to the concept of absolute time of classical physics. While, the relative images of the same motion with the speed of light differ in wavelength and periodic time preserving the speed of light according to the special theory of relativity.

Conflict of Interest

Author declares that there is no conflict of interest concerning this article.

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