IOSR Journal of Applied Physics (IOSR-JAP)
e-ISSN: 2278-4861.Volume 13, Issue 5 Ser. III (Sep. – Oct. 2021), PP 52-68
www.iosrjournals.org

What If Light Speed Is Not Constant

Edward T. H. Wu

[Abstract]
Einstein's Special Relativity is based on a postulation that the light speed in vacuum is constant no matter the light sources and observers. Because light speed is very much faster than the speed of light source, it is nearly impossible to measure the light speed on a light source moving at a comparable speed. Since there is no solid proof yet that light speed is constant, it is fair to ask what if light speed is not constant. Based on Photon Inertia Transformation and Yangton and Yington Theory, Equation of Light Speed is proposed, such that Doppler Redshift can be explained by Acceleration Doppler Effect, and Event Horizon can be interpreted by the competition between Absolute Light Speed and star acceleration speed. Both of them can also be considered as the nature proofs of that light speed is not constant. In addition, if light speed is indeed constant, then interference shall be found in Michelson Morley Experiment even Aether doesn't exist. On the contrary, if light speed is not constant, then Einstein's Special Relativity shall not be true simply because of the wrong assumption, and Velocity Time Dilation cannot be true either. Furthermore, for the same reason, relativism could be totally false and Length Contraction could be induced from human's visual memory instead of Special Relativity. After all, it is the purpose of this review to give a sound answer to the question "What if light speed is not constant".

[Keywords]
Special Relativity, General Relativity, Velocity Time Dilation, Gravitational Time Dilation, Vision of Light, Principle of Vision, Theory of Vision, Photon Inertia Transformation, Equation of Light Speed, Michelson Morley Experiment, Doppler Effect, Acceleration Doppler Effect, Red Shift, Event Horizon, Deflection of Light, Gravitational Lensing, Length Contraction, Relativism, Wu's Pairs, Yangton and Yington.

Date of Submission: 18-10-2021 Date of Acceptance: 02-11-2021

I. Introduction

Einstein's Special Relativity [1] is based on a postulation that the light speed in vacuum is constant no matter the light sources and observers. In other words, light speed observed at any reference point is the same as that observed at the moving light sources. Is it true? Scientists have debated for the whole last millennium since it was first proposed by Einstein in 1905. Is there any experimental evidence can prove this assumption? None so far we are aware of, simply because that light speed is much faster than the speed of light source. It is nearly impossible to carry out a precision experiment to measure light speed at a light source moving at a comparable speed. Since there is no solid proof yet that light speed is constant, therefore it is fair to ask what if light speed is not constant. To answer this question, we have first to know what exactly the meaning "Speed of Light" is and how to measure it. Then, we have to find out if a light carrier such as Aether exists and what are the evidences to prove that light speed is not constant. It is the purpose of this review paper to get a sound answer to "What If light speed is not constant".

II. Speed of Light

A. Absolute Space System

A reference system is needed for the measurement of light speed, which shall contain a reference point and three perpendicular axes, with the reference point as the origin located on a specific object. Since in the real universe, everything is moving with each others, there is no such thing as a fixed reference system. However, when a photon is emitted from a light source, it generates a straight optical path from its light origin (not light source) into space. This light origin has a fixed position in the space that doesn't move with the light source, nor the earth or anything else. Therefore, an Absolute Space System can thus be defined by the light origin and three fixed perpendicular axes, each directs to a far distance star (such as North Star) from the light origin.

B. Vision of Object

An object is measured (or observed) at a reference point (system) means that the position and time (coordination) of the object related to the reference point (system) is measured by a unit length and a unit time at the reference point (system). "Vision of Object" is the image of an object observed at a reference point (system)

during a period of time. More specifically, "Vision of Object" is a group of consecutive coordination of an object measured at a fixed reference point (system) in a period of time.

C. Principle of Vision

The relative positions and directions between two objects at a fixed time shall be the same no matter of the reference points (systems). In other words, one object observed by the other object at a fixed time shall have the same distance and direction (coordination) no matter the observation of the two objects at any reference point (system). This phenomenon is named "Principle of Vision" [2]. As a consequence, Absolute Space System is irrelevant and any reference point (system) can be used for the observation of Vision of Object.

D. Theory of Vision

Based on Principle of Vision, a vision of object, in spite of being observed directly at a reference point (system), can be transformed from an existing vision of object observed at the third reference point (system) by maintaining the same correlations between the object and the reference point (system) in each time frame observed at the third reference point (system). The new vision of object can be produced by superimposing the image observed in each time frame at the third reference point (system) by overlapping the reference point (system) observed in each time frame at the third reference point (system) perfectly on top of each others, while maintaining the same relative position and direction between the object and the reference point (system). This is named "Theory of Vision" [2].

Two schematic diagrams are illustrated here to explain the construction process of vision of object from one reference point (system) to another reference point (system):

Fig. 1 shows the vision of an object observed at reference point O. Object t_1, Object t_2 and Object t_3 represent the positions and directions of the object; and Observer t_1, Observer t_2 and Observer t_3 represent the positions and directions of the observer, which are observed at a reference point O in the time frame t_1, t_2 and t_3 respectively. The curve from Object t_1 to Object t_2 and Object t_3 represents the vision of the object observed at reference point O during the time period from t_1 to t_3.

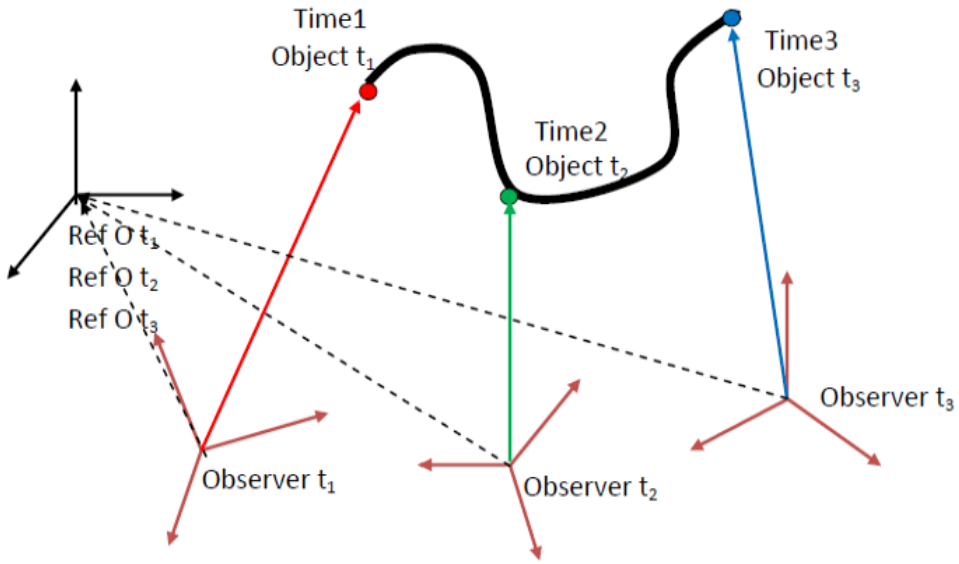

Fig. 1 Vision of an object observed at a reference point.

Fig. 2 shows the vision of object constructed at the final position of the observer (Observer t_3 in Fig. 1). In which, Observer t_1, Observer t_2 and Observer t_3 and their coordination systems are completely matched and overlapped on top of Observer t_3. The relative positions and directions of the Object t_1, Object t_2 and Object t_3 with respect to Observer t_1, Observer t_2 and Observer t_3 are maintained the same as that observed at reference point O in Fig. 1. Thus a curve from Object t_1 to Object t_2 and Object t_3 representing the vision of object observed by the observer (the new reference point (system)) during the time period from t_1 to t_3 can be constructed.

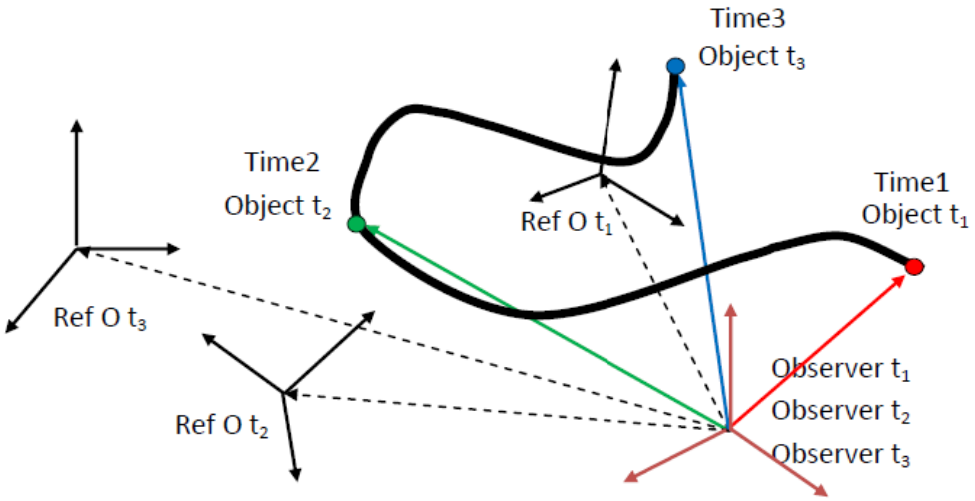

Fig. 2 Vision of an object observed at an observation point constructed from a reference point.

E. Vision of Light

Like vision of object, "Vision of Light" [2] is the image of a photon observed at a reference point (system) during a period of time. The photon is correlated to the reference point (system) by distance and direction (coordination). Similar to vision of object, in spite of observed directly at a reference point (system), Vision of Light can be constructed by superimposing the images of the photon and the reference point (system) observed at the third reference point (system) such as that of the light origin in the Absolute Space System. The reference point (system) of each time frame is overlapped on that of the final time frame. Also, the relative positions and directions between the photon and the reference point (system) are maintained as that observed at the third reference point (system).

F. Speed of Light

Speed of object is defined by the traveling distance of an object divided by the traveling time of the object measured at a reference point (system). Because the traveling distance of an object is measured based on the Vision of Object observed during a period of time at the reference point (system), therefore the speed of object is calculated by Vision of Object divided by the traveling time of the object. As a consequence, Speed of Light can also be calculated as the Vision of Light divided by the traveling time of the photon measured at the reference point (system).

Fig. 3 shows a schematic diagram of the Visions of Light of an emitted photon observed at the light origin, ground and light source in Absolute Space System at light origin (reference point). Because of the motions of earth ($\mathbf{V_E}$) and the light source ($\mathbf{V_C}$) with respect to the light origin, ground and light source are drifted away from the light origin respectively. Assuming all motions are at constant speeds, after a time interval Δt, the Visions of Light can be represented by the following straight lines: **AP**–the Vision of Light observed at light origin (black line), **BP**–the Vision of Light observed at ground (red line) and **CP**–the Vision of Light observed at the light source (green line) respectively. They all end at the same final position (point **P**) of the emitted photon.

AP (Vision of Light observed at light origin) is the vector summation of **CP** (Vision of Light observed at the light source) and **AC** (moving path of the light source observed at the light origin). Also, $\mathbf{C_O}$ (light speed observed at light origin) is the vector summation of $\mathbf{C_S}$ (light speed observed at the light source) and $\mathbf{V_C}$ (moving speed of the light source observed at the light origin).

$$\mathbf{AP} = \mathbf{CP} + \mathbf{AC}$$
$$\mathbf{C_O} = \mathbf{C_S} + \mathbf{V_C}$$

Similarly, **BP** (Vision of Light observed at ground) is the vector summation of **CP** (Vision of Light observed at the light source) and **BC** (moving path of the light source observed at ground). Also, $\mathbf{C_E}$ (light speed observed at ground) is the vector summation of $\mathbf{C_S}$ (light speed observed at the light source) and $\mathbf{V_S}$ (moving speed of the light source observed at ground).

$$\mathbf{BP} = \mathbf{CP} + \mathbf{BC}$$

$$\mathbf{C_E = C_S + V_S}$$

According to Yangton and Yington Theory [3], because of the constant repulsive string forces generated between photon and the adjacent Wu's Pairs, the building blocks of the universe [4], on the surface of the light source in the photon two stage emission process [5], a constant light speed $\mathbf{C_S}$ (Absolute Light Speed $3x10^8$ m/s) [5] in the photon ejection direction can always be observed at the light source regardless of the frequency of the photon and the moving speeds of the light source away from the reference points such as that observed either at the light origin or at the ground ($\mathbf{V_C}$ or $\mathbf{V_S}$).

When a photon observed at different observation points (reference points) such as that of light origin Point A, ground observer Point B and light source Point C, because of the same event, the traveling times of the photon are the same ($\Delta t_E = \Delta t_S = \Delta t_O$), but the Visions of Light are different (**AP** ≠ **BP** ≠ **CP**). Since light speed is measured as the Vision of Light divided by the photon traveling time observed at the observation point (reference point), therefore the light speeds are different ($\mathbf{C_E \neq C_S \neq C_O}$) at different observation positions (reference points). These oppose to Einstein's Special Relativity in which he claimed that light speed is always constant no matter light sources and observers (reference points).

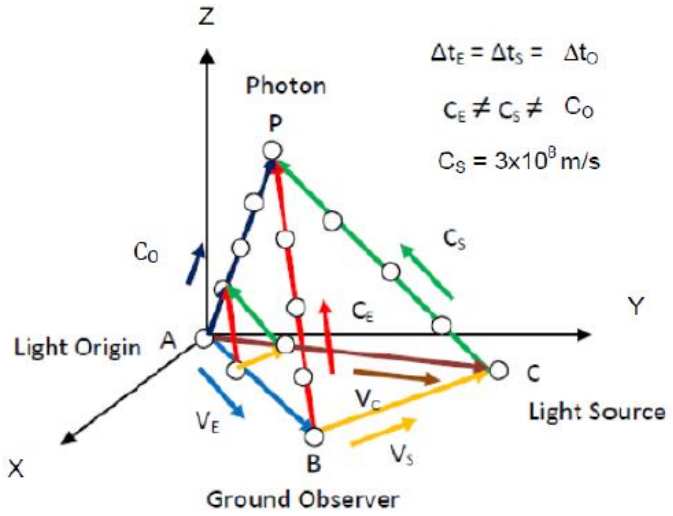

Fig. 3 Visions of Light of an emitted photon observed at the light origin (black line), ground (red line) and light source (green line) in Absolute Space System.

G. Equation of Light Speed

When a photon emitted from a light source, due to the Vision of Light and Photon Inertia Transformation [2], it undergoes two separate motions: ejection motion and inertia motion. As a result, "Speed of Light" observed at any reference point is a vector summation of "Absolute Light Speed" 3 x 10^8 m/s, the moving speed of the photon away from the light source observed at the light source, and "Inertia Light Speed", the moving speed of the light source observed at the reference point. This theory is named "Equation of Light Speed" [2].

$$\mathbf{C' = C + V}$$

Where **C'** is the light speed observed at the reference point, **C** is the Absolute Light Speed $3x10^8$ m/s observed at the light source and **V** is the Inertia Light Speed, the moving speed of the light source observed at the reference point.

III. Nature Phenomena

The Equation of Light Speed is the "Law of Light Propagation" which shows directly that "Light Speed Is Not Constant". In addition, it can be used to explain many physical phenomena such as Acceleration Doppler Effect and Event Horizon, etc. Or vise versa, that those phenomena can be considered as the nature proofs of "Light Speed Is Not Constant".

A. Doppler Effect

The frequency of a wave-like signal such as sound or light is dependent on the relative movement of the sender and the receiver. This phenomenon is known as the "Doppler Effect" [6]. Conventionally, it is understood that when a source of light is moving toward the observer (reference point), each successive photon is emitted from a position closer to the previous one. In other words, the wavelength between two subsequent photons is smaller, which causes an increase in the frequency and a shift in the wavelength to the blue end of the spectrum. This is commonly known as "Blue Shift". Conversely, if the source of light is moving away from the observer (reference point), each photon is emitted from a position farther from the previous photon, resulting in long wavelengths between the two subsequent photons. This causes a reduction in the frequency and a shift in wavelength toward the red end of the spectrum, which is known as "Redshift" (Fig. 4).

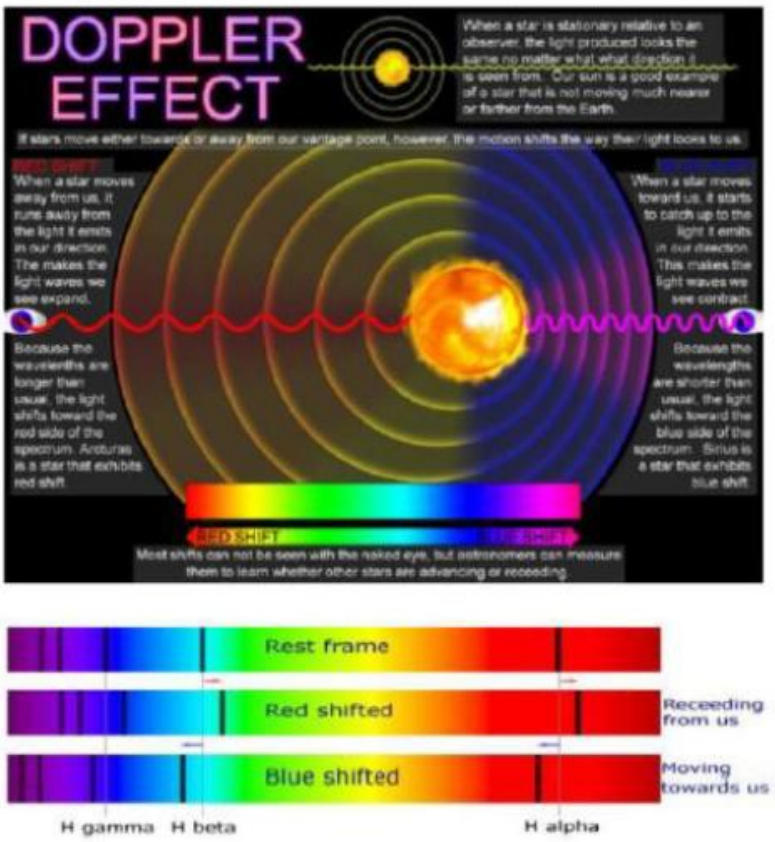

Fig. 4 Doppler Effect and Blueshift & Redshift phenomena.

Like most scientists including Einstein, I first thought that the Blueshift, Redshift and the Doppler Effect could only exist in the Non-Inertia Transformation process [7] as that in sound propagation. I therefore believe that a photon emitted from a light source travels in space at a constant Absolute Light Speed 3×10^8 m/s can be observed at its origin in Absolute Space System, without any influence from its light source, as noted in my previous publication [7]. This, however, is in conflict with my logical thinking. It is hard to believe that a ball-like particle thrown out of the window of a train will not follow the train. The concept that photon emission is a Non-Inertia Transformation has bothered me for quite some time until I developed the Acceleration Doppler Effect based on Photon Inertia Transformation to solve the problem.

B. Acceleration Doppler Effect

The Doppler Effect can be proved easily in the Non-Inertia Transformation process with the signal source traveling at a constant speed either toward or away from the observer such as that of sound propagation. However, the photon emission from the light source is an Inertia Transformation process (Fig. 3) [8], both Redshift and Blueshift occur only if the wavelength of light changes with the acceleration of the light source such as those found in spiral galaxies. This phenomenon is called "Acceleration Doppler Effect" [8].

Fig. 5 is an Absolute Space System at light origin (reference point). Because the star is far away from earth, both earth and light origin are literally stationary to each other, therefore earth can also be considered as a

reference point for the same Absolute Space System. As a result, all the measurement observed on earth is the same as that observed at the light origin in the same Absolute Space System.

The light source (star) can either move toward or away from the observer on earth. Assuming it takes time t for a photon traveling from light origin to earth. V_o is the speed of the light source (star) at the beginning, V_t is the speed of the light source (star) at time t and a is the constant acceleration of the light source (star) in time t. S is the distance of the light source (star) traveling from the light origin in time t. P is the distance of the photon traveling from the light origin to earth at time t, V_ot is the distance of the photon dragged by the light source (star) in time t and D is the distance between the light source (star) and the photon when the photon reaches earth at time t. Also λ_1 is the wavelength, ν_1 is the frequency and C_1 is the light speed of the photon observed on light origin and earth. With the above notations, Zeroshift, Blueshift and Redshift phenomena can be studied based on Acceleration Doppler Effect (Fig. 5).

First, the distance vectors between light origin, light source (star) and photon can be correlated to each others as follows:

OS = **S** = Distance vector from light origin to light source (star) = Movement of light source (star) away from light origin.

SP = **D** = Distance vector from light source (star) to photon = Vision of light observed from light source (star).

OP = **P** = Distance vector from light origin to photon = Vision of light observed from light origin and ground.

$$\mathbf{OP} = \mathbf{OS} + \mathbf{SP}$$
$$\mathbf{P} = \mathbf{S} + \mathbf{D}$$
$$\mathbf{D} = \mathbf{P} - \mathbf{S}$$

Also, according to Equation of Light Speed, when photon separate from the light source (star), the speed of photon observed at the light origin **C'** is equal to the vector summation of light speed observed at the light source (star) **C** (Absolute Light Speed $3x10^8$ m/s) and the speed of the light source (star) observed at the light origin $\mathbf{V_0}$. Therefore,

$$\mathbf{C'} = \mathbf{C} + \mathbf{V_0}$$

And

$$\mathbf{OP} = \mathbf{P} = \mathbf{C'}t = \mathbf{C}t + \mathbf{V_0}t = (Ct + V_0t)\mathbf{s} = P\mathbf{s}$$
$$\mathbf{OS} = \mathbf{S} = \mathbf{V_0}t + \tfrac{1}{2}\,\mathbf{a}t^2 = (V_0t + \tfrac{1}{2}\,at^2)\mathbf{s} = S\mathbf{s}$$
$$\mathbf{D} = \mathbf{P} - \mathbf{S} = (P - S)\mathbf{s}$$

Where **C'** is the light speed observed at the light origin, **C** is the Absolute Light Speed observed at the light source (star), $\mathbf{V_0}$ is the initial moving speed of light source (star) observed at the light origin and t is time, **s** is the positive unit vector toward earth.

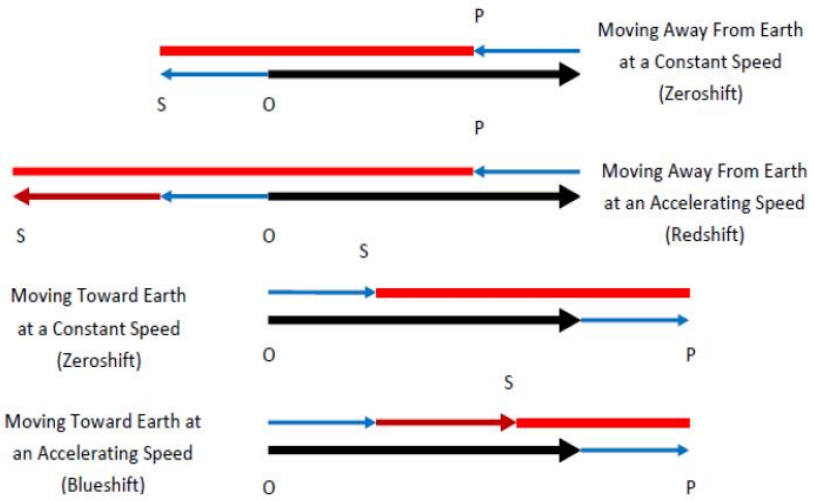

Fig. 5 Zeroshift, Redshift and Blueshift caused by Acceleration Doppler Effect.

1. Zeroshift

When the light source (star) either moves toward or away from the observer (reference point) on earth at a constant speed ($V_o = V_t$ and a = 0), Zeroshift can be observed.

(a) In case the light source (star) moves away from earth (reference point),

$S = -V_ot$

$P = Ct - V_ot$

$D = P - S = Ct$

Therefore,
$\lambda_1 = D/\nu t = Ct/\nu t = C/\nu = \lambda$
$C_1 = P/t = (Ct - V_o t)/t = C - V_o < C$
$\nu_1 = C_1/\lambda_1 = (C - V_o)/\lambda < \nu$
When the light source (star) moves away from earth (reference point) at a constant speed, the wavelength maintains unchanged, but both frequency and light speed become smaller. Zeroshift can thus be observed. However, because the color of light is dominated by frequency instead of wavelength, therefore this case can also be considered as Redshift.

(b) In case the light source (star) moves toward the observer (reference point) on earth,
$S = V_o t$
$P = Ct + V_o t$
$D = P - S = Ct$
Therefore,
$\lambda_1 = D/\nu t = Ct/\nu t = C/\nu = \lambda$
$C_1 = P/t = (Ct + V_o t)/t = C + V_o > C$
$\nu_1 = C_1/\lambda_1 = (C + V_o)/\lambda > \nu$
When the light source (star) moves toward earth (reference point) at a constant speed, the wavelength maintains unchanged, but both frequency and light speed become bigger. Zeroshift can thus be observed. However, because the color of light is dominated by frequency instead of wavelength, therefore this case can also be considered as Blueshift.

2. Blueshift

In case the light source (star) moving toward the observer (reference point) on earth at a constant acceleration speed,
$S = V_o t + \frac{1}{2} at^2$
$P = Ct + V_o t$
$D = P - S = Ct - \frac{1}{2} at^2$
Therefore,
$\lambda_1 = D/\nu t = (Ct - \frac{1}{2} at^2)/\nu t = (C - \frac{1}{2} at)/\nu < \lambda$
$C_1 = P/t = (Ct + V_o t)/t = C + V_o > C$
$\nu_1 = C_1/\lambda_1 = (C + V_o)/((C - \frac{1}{2} at)/\nu) > \nu$
When the light source (star) moves toward earth (reference point) at a constant acceleration speed, the wavelength becomes smaller, both the frequency and light speed become bigger, and thus Blueshift can be observed.

3. Redshift

In case the light source (star) moving away from the observer (reference point) on earth at a constant acceleration speed,
$S = -(V_o t + \frac{1}{2} at^2)$
$P = Ct - V_o t$
$D = P - S = Ct + \frac{1}{2} at^2$
Therefore,
$\lambda_1 = D/\nu t = (Ct + \frac{1}{2} at^2)/\nu t = (C + \frac{1}{2} at)/\nu > \lambda$
$C_1 = P/t = (Ct - V_o t)/t = C - V_o < C$
$\nu_1 = C_1/\lambda_1 = (C - V_o)/((C + \frac{1}{2} at)/\nu) < \nu$
When the light source (star) moves away from earth (reference point) at constant acceleration speed, the wavelength becomes bigger, both the frequency and light speed become smaller, and thus Redshift can be observed.

C. Event Horizon

When a light source accelerating toward the center of a black hole, because of the Photon Inertia Transformation, the photon emitted from the light source bears two competing opposite speeds: (1) outward Absolute Light Speed (**C**) and (2) inward Inertia Light Speed (**V**).
According to Equation of Light Speed,

$$\mathbf{C'} = \mathbf{C} + \mathbf{V}$$

At Event Horizon,

$|\mathbf{C}| = |\mathbf{V}|$, therefore $\mathbf{C'} = \mathbf{0}$.

Inside Event Horizon,

$|\mathbf{C}| < |\mathbf{V}|$, therefore **C'** follows **V** and goes inwards.

Outside Event Horizon,

|**C**| > |**V**|, therefore **C'** follows **C** and goes outwards.

Where **C'** is the light speed observed on earth (reference point), **C** is the Absolute Light Speed observed at the light source and **V** is the speed of light source moves away from the light origin (Inertia Light Speed).

As a result, at the Event Horizon [9], the net speed of the photon is zero and the photon is in idle. Outside the Event Horizon (Ergosphere), the Absolute Light Speed is bigger than the Inertia Light Speed, the photon can move outwards and escape from the black hole. On the other hand, inside the Event Horizon, the Absolute light Speed is smaller than the Inertia Light Speed, the photon moves inwards and can never escape from the black hole (Fig. 6) [10]. As a result, the existence of a "Black Hole" can thus be predicted.

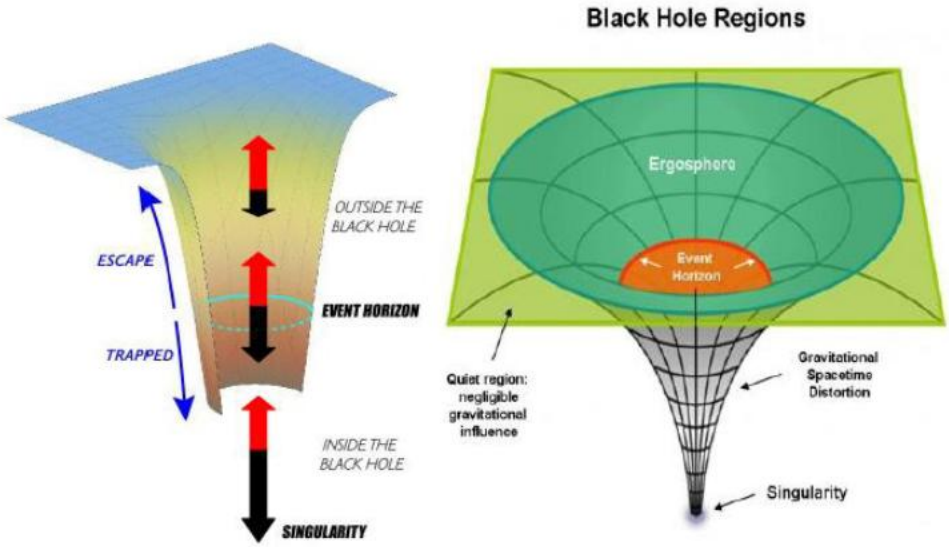

Fig. 6 The Black Hole Regions: (1) Ergosphere (C > V) (2) Event Horizon (C = V) and (3) Inside the Black Hole (C < V). C is light speed and V is the light source speed.

In both Acceleration Doppler Effect and Event Horizon, light speeds observed on earth (reference point) are different subject to the relative directions and speeds between the star (light source) and earth (reference point). Therefore, Special Relativity cannot be true simply because that light speed is not constant.

IV. Various Light Speeds in Space

A. Absolute Light Speed

According to Yangton and Yington Theory, in photon two stage emission process, because of the constant repulsive string forces generated between photon and the adjacent Wu's Pairs on the surface of the light source, a constant "Absolute Light Speed" ($3x10^8$ m/s) in the photon ejection direction can always be observed at the light source regardless of the frequency of the photon (Fig. 7).

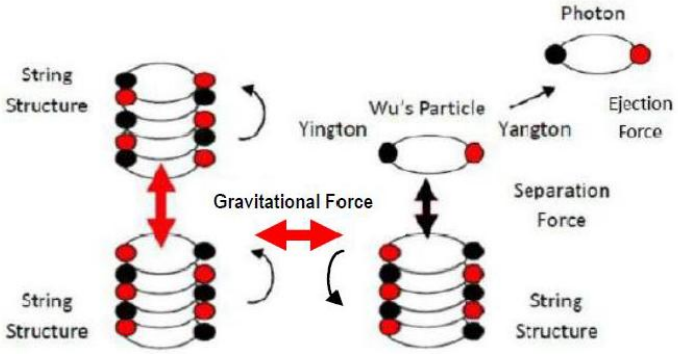

Fig. 7 Gravitational force between two gravitons (string structures) versus separation force between Wu's Pair and string structure

B. Different Light Speeds by Observations

The speed of light is calculated by the Vision of Light divided by the traveling time of light. Since different Visions of Light of a photon can be observed by the observers (reference points) at different moving speeds and directions, it is obvious that different light speeds in space can be observed by moving observers (reference points) other than those at the light source. As shown in Fig. 3, in addition to the Absolute Light Speed C_S (3×10^8 m/s) observed at the light source, light speeds C_E and C_O can also be observed at ground and light origin respectively. This opposes to Einstein's Special Relativity, in which it is claimed that light speed in vacuum (space) is always constant, no matter the directions and speeds of the light sources and observers (reference points).

Furthermore, if an observer (reference point) is moving at the Absolute Light Speed in the same direction of the light beam, then the light speed observed by the moving observer (reference point) is nearly zero and the photon is practically frozen with respect to the observer (reference point).

Because,

$$\mathbf{C' = C + V}$$
$$\mathbf{V = - C}$$

Therefore,

$$\mathbf{C' = 0}$$

This also oppose to Einstein's Special Relativity, in which Einstein claimed that if he was running with a photon at light speed, he could still see the photon moving away from him at the light speed. It is totally impossible, unless he was running with the light source at a light speed away from the light origin.

Because,

$$\mathbf{C' = C + V}$$
$$\mathbf{V = 0}$$

Therefore,

$$\mathbf{C' = C}$$

C. Same Light Speed in Inertia System

Fig. 8 shows that a photon traveling in space, the same Vision of Light (red line) can be observed at different reference points in an Inertia System (all reference points are stationary to each others). Therefore, the light speeds observed in an inertia system should always be constant, no matter where the observers (reference points) are. However this constant speed can be different from the Absolute Light Speed (3×10^8 m/s) if it is observed in a different Inertia Systems other than that of the light source.

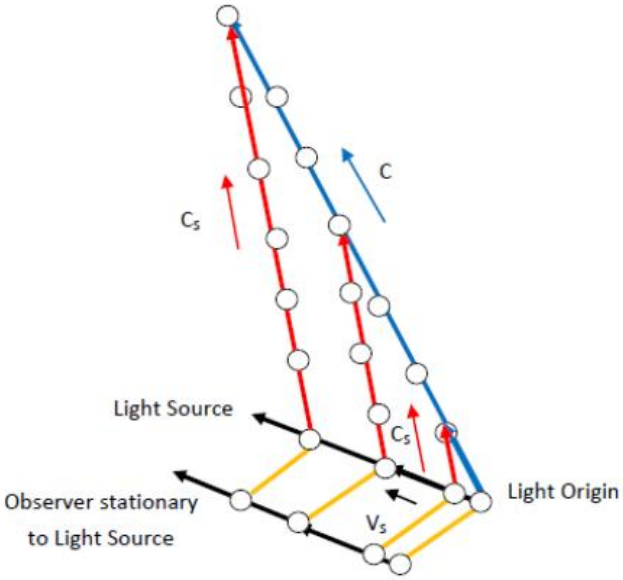

Fig. 8 Vision of Light (blue line) observed at light origin and the Vision of Light (red line) observed at the light source and those stationary to the light source.

In both Laser Gyroscope and Fiber Gyroscope, because of the same laser (light source), the speed of light is the same. However, the light traveling paths (visions of light) are different between forward and backward rotations, such that interference can be generated and the rotation angle of the gyroscope can be calculated.

D. Light Speeds on Earth

C_E (light speed observed at ground) is the vector summation of C_S (light speed observed at the light source) and V_S (moving speed of the light source observed at ground).

$$\mathbf{C_E = C_S + V_S}$$

However, in reality, V_S is very small compare to C_S the Absolute Light Speed ($3x\ 10^8$ m/s).

$$\mathbf{C_S \gg V_S}$$

$$\mathbf{C_E = C_S + V_S \approx C_S}$$

Therefore, the light speed observed by the ground observer (reference point) is extremely close to the Absolute Light Speed.

E. Limit of Light Speed

Because Wu's Pairs are the finest building blocks of all matters in the universe, when a Wu's Pair separates from the surface of a substance (string structures) to form a free photon, it can be accelerated by the repulsive string forces between the two Yangton particles and also the two Yington particles (one from the emitting photon and the other one from the adjacent Wu's Pair) on the surface of the parent substance, to reach an extremely high speed $3x10^8$ m/s. Therefore, it is suggested that the Absolute Light Speed $3x10^8$ m/s is the highest speed any object can move in the universe. However, in theory, there should be no limit. The speed of an object is all dependent on the driving force and its corresponding acceleration.

V. Special Relativity

Einstein's Special Relativity [1] is based on a postulation that the light speed in vacuum is constant no matter the light sources and observers. This conflicts to the principles of Photon Inertia Transformation that the light speed changes with observers (reference points) moving at different speeds and directions with respect to the light sources (Fig. 3). More specifically, it against the Equation of Light Speed that the speed of light observed at the reference point is a vector summation of the Absolute Light Speed 3×10^8 m/s (the speed of photon observed at the light source) and the Inertia Light Speed (the speed of light source observed at the reference point).

A. Velocity Time Dilation

Fig. 9 shows a typical example of Einstein's Special Relativity, in which a light clock emits photons to a mirror on the roof of a train while it is moving away from a ground observer (reference point).

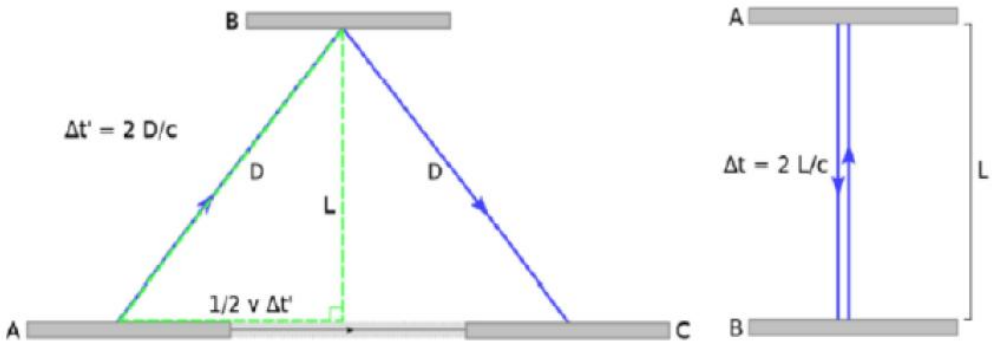

Fig. 9 Moving light clock and Velocity Time Dilation Theory.

Because, Einstein's Special Relativity assumes that light speed is always constant no matter the light sources and observers (reference points).

$C = C'$

$(\Delta t' C/2)^2 = (\Delta t C/2)^2 + (V \Delta t'/2)^2$

$\Delta t' = (1-V^2/C^2)^{-1/2} \Delta t$

Because

$$V < C$$

Therefore

$$\Delta t < \Delta t'$$

Where Δt is the light traveling time measured at the light source and $\Delta t'$ is the light traveling time measured on ground.

As a consequence, the light traveling time measured at the light source Δt is smaller than the light traveling time measured on ground $\Delta t'$. This phenomenon is called Velocity Time Dilation [11].

A similar result can also be obtained in the derivation of Lorentz transformation, where $\Delta t' = (1- V^2/C^2)^{-1/2} \Delta t$ is obtained by the postulations that the speed of light C is a constant and the reference system is moving only in the horizontal direction (X direction).

However, according to Vision of Light and Photon Inertia Transformation, light speed is not constant. In Fig. 9, D is the Vision of Light observed on the ground (reference point) and L is the Vision of Light observed at the light source. Also for the same event, time duration is the same, no matter the observations. Therefore,

$C' = 2D/\Delta t'$ & $C = 2L/\Delta t$

$D^2 = L^2 + (V\Delta t'/2)^2$

$\Delta t' = \Delta t$

$(C'\Delta t/2)^2 = (C\Delta t/2)^2 + (V\Delta t/2)^2$

And

$$C' = (C^2 + V^2)^{1/2}$$

The light speed observed on the ground is $C' = (C^2 + V^2)^{1/2}$ which is larger than that observed at light source $C = 3x10^8$ m/s. As a result, oppose to Einstein's Special Relativity and Velocity Time Dilation, light speed is not constant and time doesn't change with velocity neither.

B. Twin Paradox

Motion is relative. Whatever the motions that the twin brothers experienced in their own reference system, either in a spaceship or on earth, are identical except in opposite directions. Slower time and younger age can be claimed by both brothers in their own reference systems, which conflicts with the common principles of logical thinking. Therefore, Twin Paradox [12] proves that Velocity Time Dilation is a false theory and can never exist.

C. Pure mathematical definition

Based on Equation of Light Speed, Einstein's Velocity Time Dilation Theory can be mathematically derived from a pure definition (no physical meaning) of Einstein's Imaginary Time upon his constant light speed postulation [13].

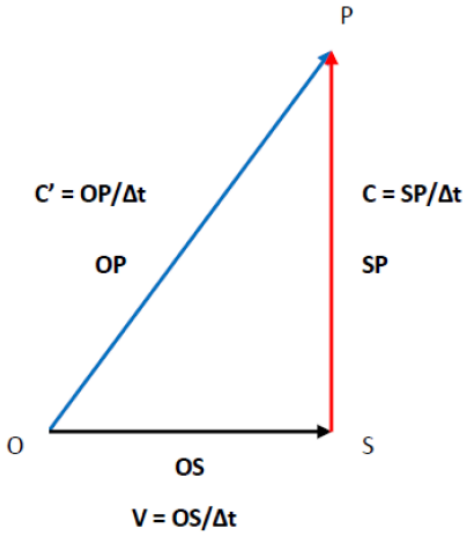

Fig. 10 the correlation between the light speed C' observed at the reference point O, Absolute Light Speed C observed at the light source and the speed of light source V observed at the reference point O.

Fig. 10 shows the correlation between the trace of a photon (vision of light) **OP** observed at the reference point O, the trace of light source (vision of object) **OS** observed at the reference point O and the trace of photon **SP** observed at the light source S through a small duration Δt.
Because
C' = **OP**/Δt
C = **SP**/Δt
V = **OS**/Δt
Also, according to Equation of Light Speed. Therefore,

$$\mathbf{C' = C + V}$$

Where the equation is a vector summation, **C'** is the light speed observed at the reference point O, **C** is the Absolute Light Speed (3×10^8 m/s on earth) observed at the light source S and **V** is the speed of light source observed at the reference point O.
Einstein assumed light speed is constant, no matter of the observers, therefore the light speed observed at reference point should be C instead of C'. As a consequence, he defined an imaginary time Δt' to fulfill OP = C Δt'.
Δt' = OP/C (Einstein's definition)
Because,
Δt = OP/C'
Δt' = (C'/C) Δt
If the direction of Absolute Light Speed **C** is perpendicular to the speed of light source **V**, then
$C^2 = C'^2 - V^2$
$C^2/C'^2 = 1 - V^2/C'^2$
$C'/C = 1/(1-V^2/C'^2)^{1/2}$
Therefore,
$\Delta t' = 1/(1-V^2/C'^2)^{1/2}\ \Delta t$
Where Δt' is Einstein's imaginary time. It is a pure mathematical definition without any physical meaning. The only purpose of the existence of Δt' is to fulfill OP = C Δt', the trace of light (Vision of light) is equal to Einstein's Imaginary time Δt' multiple the constant light speed C.
Also,
V' = VΔt/Δt' (Einstein's definition)
C = C'Δt/Δt' (Einstein's definition)
Then
$\Delta t' = 1/(1-V'^2/C^2)^{1/2}\ \Delta t$
If $V' \rightarrow C$, then $\Delta t' \rightarrow \infty$
Where Δt' is Einstein's imaginary time and V' is Einstein's imaginary speed of light source observed at the reference point. This equation is identical to Einstein's Velocity Time Dilation.

As a result, Einstein's Velocity Time Dilation is nothing but an imagination or a pure mathematical definition. Its only purpose is to support Einstein's wrong postulation "Light speed is constant no matter the light sources and observers".

D. Relativism

According to Special Relativity, subject to the constant light speed, Mass, Momentum, Energy and Length of a traveling object can also change with the speed of the object [14] when observed on earth. This is called Relativism.

$$M' = 1/(1-V^2/C^2)^{1/2}\ M$$
$$P' = 1/(1-V^2/C^2)^{1/2}\ MV$$
$$E^2 = M^2C^4 + P^2C^2$$
$$L' = (1-V^2/C^2)^{1/2}\ L$$

However, according to Yangton and Yington Theory, for a corresponding identical object or event, because the amounts of unit quantities remain unchanged, therefore, mass, length and time are all dependent on their unit quantities. Wu's Unit Length (l_{yy}) and Wu's Unit Time (t_{yy}) are correlated to each other by Wu's Spacetime Equation $t_{yy} = \gamma l_{yy}^{3/2}$ [15]. Both of them are also dependent on the local gravitational field and aging of the universe, except Wu's Unit Mass (m_{yy}) which is constant because of The Law of Conservation of Mass. As a result, mass, length and time have nothing to do with the speed of object; it is Einstein's mistake taking velocity as a principle factor in his relativity and relativism theories [16].

E. Length Contraction

The length of an object measured by a human observer, along the direction of motion, is shorter than the length measured by the observer at rest with the object. This phenomenon is known as "Length Contraction" [17]. Because motion is relative, the reference point can be chosen either at the observer or on the object. For better illustration, here we use the object as the reference point in explanation of the phenomenon.

Since length contraction is described by physicists as a common experience observed by a high speed traveler (nowhere close to light speed), therefore, I propose it is caused by human visual memory rather than the Velocity Time Dilation [11] and related Relativism Theories that are derived from Einstein's Special Relativity at a speed close to light speed.

In the beginning, I am a little confused of the mechanism of Length Contraction. As a consequence, some mistakes were made in my previous publication [18]. A detailed analysis that Length Contraction can be affected by human visual memory is discussed as follows:

Fig. 11 shows the effect of length contraction caused by human visual memory [19]. When a human observer travels along a linear object from the closer end Point A of the object at an angle α with speed V_1, due to human visual memory (1/30 seconds), observer can see at Point M with a distance $V_1/30$ from Point A, simultaneously the photon from adjacent Point A (by memory) and the photon from far distance Point B (both are stationary to the reference Point M). Therefore, a length of the object L_1 (= Ct_1) which is equal to the distance between the traveler Point M and Point B can be observed by the traveler. In case that L_1 is smaller than the length of the object L (= Ct) measured on earth, then Length Contraction can be observed.

As a result, for the same angle (α), traveler with higher speed ($V_1 > V_2$) can find smaller length of object ($Ct_1 < Ct_2$). Also, for the same speed (V_2), traveler with smaller angle ($\beta < \alpha$) can find smaller length of object ($Ct_3 < Ct_2$). In case of a very low speed ($V \rightarrow 0$), the length of the object observed by the traveler is about the same as that observed on ground (Ct = L). Furthermore, for a position coupling with V/30 and Ct outside the Ct = L circle (the pink area in Fig. 11), the length of the object observed by the traveler is bigger than the length L observed on ground. In other words, Length Expansion can also be found by the observer traveling at a large angle away from the object.

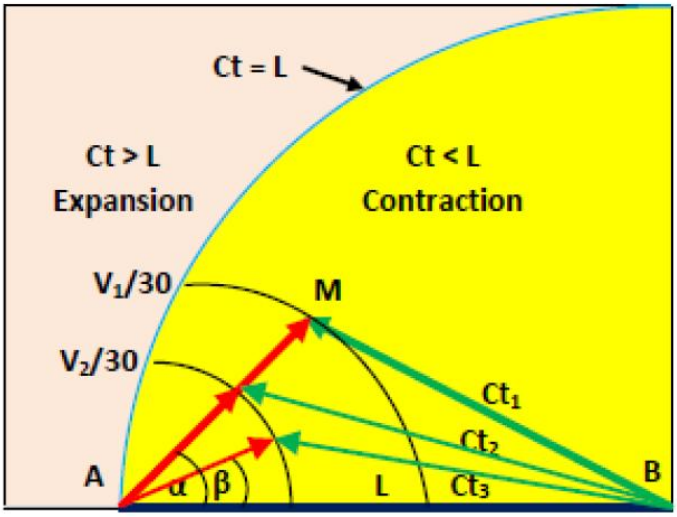

Fig. 11 Length contraction caused by human visual memory

VI. Aether and Michelson – Morley Experiment

In the 18th century, physicists believed that Aether was the carrier of light (electromagnetic waves) in space. Michelson – Morley Experiment [20] was designed to prove the existence of Aether by detecting the difference of light speeds through the optical interference caused by the motion of Aether.

Fig. 12 illustrates the Michelson – Morley Experiment. Where AP and all the red lines are the Vision of Light observed at the light origin in Absolute Space System in which light travels obeying Equation of Light Speed. BP and all the black lines are the Vision of Light observed at the light source in which light travels at a constant Absolute Light Speed ($3x10^8$ m/s). V_E is the speed of light source drifted away from light origin observed at the light origin. When photons reach the semi-transparent mirror (point P) through Vision of Light BP observed at the light source, they split into two perpendicular light beams. These two beams are bounced back from the two end mirrors placed at equal distances from the center, then recombined at the semi-transparent mirror and finally received by the detector.

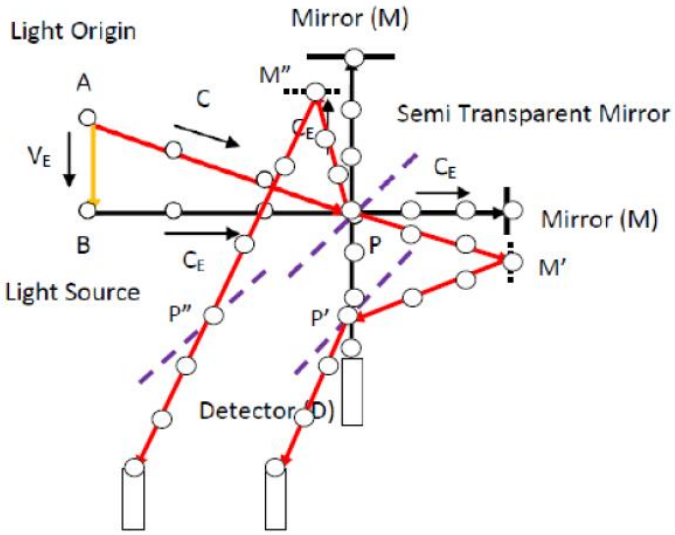

Fig. 12 Michelson – Morley Experiment with the Visions of Light observed at the light source (black line) and light origin (red line)

There are two ways to observe the experiment, from either the light origin or the light source. The result should be exactly the same. Here we try to observe the experiment from the light origin (reference point) in Absolute Space System which is more complicated than that from the light source.

According to Equation of Light Speed, light speed $\mathbf{C_o}$ observed at the light origin is a vector summation of Absolute Light Speed $\mathbf{C_E}$ (3×10^8 m/s) observed at the light source and the speed of light source $\mathbf{V_E}$ drift away from light origin observed at the light origin.

$$\mathbf{C_o = C_E + V_E}$$

However, when photon hits the mirrors (semi-transparent and two end mirrors), the direction of $\mathbf{C_E}$ changes, and the value of C_O is different:

$C_O = (C_E^2 + V_E^2)^{1/2}$ ($\mathbf{C_E}$ is perpendicular to $\mathbf{V_E}$)

$C_O' = C_E - V_E$ ($\mathbf{C_E}$ and $\mathbf{V_E}$ are in opposite directions)

$C_O'' = C_E + V_E$ ($\mathbf{C_E}$ and $\mathbf{V_E}$ are in the same direction)

A. If Aether doesn't exist

The total time needed for photon to travel in the paths of PM" and M"P" (Both PM" and M"P" are parallel to PM. They are tilled here just for easy explanation) should be the same as that of PM' and M'P'.

Because,

$\Delta t = PM/C_E$

$\Delta t''_1 = PM''/(C_E - V_E) = (C_E\Delta t - V_E\Delta t)/(C_E - V_E) = \Delta t$

$\Delta t''_2 = M''P''/(C_E + V_E) = (C_E\Delta t + V_E\Delta t)/(C_E + V_E) = \Delta t$

$\Delta t'_1 = PM'/(C_E^2 + V_E^2)^{1/2} = ((C_E\Delta t)^2+(V_E\Delta t)^2)^{1/2}/(C_E^2 + V_E^2)^{1/2} = \Delta t$

$\Delta t'_2 = M'P'/(C_E^2 + V_E^2)^{1/2} = ((C_E\Delta t)^2+(V_E\Delta t)^2)^{1/2}/(C_E^2 + V_E^2)^{1/2} = \Delta t$

Therefore,

$$\Delta t''_1 + \Delta t''_2 = \Delta t'_1 + \Delta t'_2 = 2\Delta t$$

Where PM", M"P", PM' and M'P' are paths of lights (visions of lights), and $\Delta t''_1$, $\Delta t''_2$, $\Delta t'_1$and $\Delta t'_2$ are respective photon traveling times observed at light origin.

As a result, in case Aether doesn't exist, based on Equation of Light Speed, the same traveling time of the two split light beams can be obtained, therefore no optical interference shall be expected.

In contrast, if Aether doesn't exist, while light speed is constant, then

$\Delta t''_1 = PM''/C_E = (C_E\Delta t - V_E\Delta t)/C_E$

$\Delta t''_2 = M''P''/C_E = (C_E\Delta t + V_E\Delta t)/C_E$

$\Delta t'_1 = PM'/C_E = ((C_E\Delta t)^2+(V_E\Delta t)^2)^{1/2}/C_E$

$\Delta t'_2 = M'P'/C_E = ((C_E\Delta t)^2+(V_E\Delta t)^2)^{1/2}/C_E$

Therefore,

$$\Delta t''_1 + \Delta t''_2 \neq \Delta t'_1 + \Delta t'_2$$

As a result, if Aether doesn't exist, while light speed is constant, then without obeying Photon Inertia Transformation and Equation of Light Speed, different traveling times of the two split light beams can be obtained, and optical interference shall be expected.

B. If Aether does exist

Michelson – Morley believed that because of the Aether flow (V_A), photon traveling time in the paths of PM" and M"P" should be different from that of PM' and M'P', such that an optical interference could be generated. Since the traveling time of an event is the same no matter the observation positions, also $V_E = 0$, the traveling time can be easily measured at light source (reference point) instead of that at the light origin. Therefore,

$\Delta t''_{A1} = PM''/(C_E + V_A)$

$\Delta t''_{A2} = M''P''/(C_E - V_A)$

$PM'' = M''P'' = PM$

$\Delta t''_{A1} + \Delta t''_{A2} = PM\,(2C_E/(C_E^2 - V_A^2))$

$\Delta t''_{A1} + \Delta t''_{A2} > 2PM/C_E$

$$\Delta t''_{A1} + \Delta t''_{A2} > 2\Delta t$$

Also,

$\Delta t'_{A1} = PM'/(C_E^2+V_A^2)^{1/2} = ((C_E\Delta t)^2+(V_A\Delta t)^2)^{1/2}/(C_E^2+V_A^2)^{1/2} = \Delta t$

$\Delta t'_{A2} = M'P'/(C_E^2+V_A^2)^{1/2} = ((C_E\Delta t)^2+(V_A\Delta t)^2)^{1/2}/(C_E^2+V_A^2)^{1/2} = \Delta t$

$$\Delta t'_{A1} + \Delta t'_{A2} = 2\Delta t$$

Therefore,

$$\Delta t''_{A1} + \Delta t''_{A2} > \Delta t'_{A1} + \Delta t'_{A2}$$

Where PM", M"P", PM' and M'P' are paths of lights (visions of lights), and $\Delta t''_{A1}$, $\Delta t''_{A2}$, $\Delta t'_{A1}$and $\Delta t'_{A2}$ are respective photon traveling times observed at light source under the influence of Aether.

As a result, in case Aether does exist, based on Equation of Light Speed, different traveling times of the two split light beams can be obtained, therefore optical interference shall be expected.

Since no optical interference was ever found in the experiment, Michelson and Morley concluded that Aether doesn't exist in the universe. In addition, Michelson – Morley Experiment has proved: (1) Photon travels like a particle no need of Aether or any other media. (2) Photon Inertia Transformation does exist and Equation of Light Speed must be obeyed.

VII. General Relativity

Based on Einstein's General Relativity [1], acceleration is the principle factor of the universe. Because both length and time can be influenced by acceleration, and acceleration reflects the magnitude of gravitational force, therefore, the dimension of an object can increase with large acceleration or massive gravitational field, and clock runs more quickly at lower gravitational field or smaller acceleration, which is known as "Gravitational Time Dilation" [21]. Furthermore, according to Einstein's Spacetime Theory, light can be bent with the curvature of spacetime induced by the acceleration or gravitational force without changing the light speed.

VIII. Yangton and Yington Theory

In contrast, according to Wu's Spacetime Shrinkage Theory [15] based on Yangton and Yington Theory, large gravitational field implies heavy bombardment of gravitons which can cause the slowdown of Yangton and Yington circulation and decrease the revolution frequency. In other words, large gravitational field can increase Wu's Unit Length l_{yy} (diameter) and Wu's Unit Time t_{yy} (period) of Wu's Pairs in all subatomic particles of the object or event, such that the space (dimension) of the object could be enlarged and the time (duration) of the event could be slowed down. This agrees very well with Einstein's General Relativity and Gravitational Time Dilation. However, because acceleration is dependent on the total forces, and gravitational force is only one of the Four Basic Forces, Einstein's general relativity is true only when acceleration is solely caused by the gravitational field. Also, unlike General Relativity, based on Yangton and Yington Theory, both light speed and direction can change with gravitational field and aging of the universe ($C \propto l_{yy}^{-1/2}$) [22].

IX. Gravitational Lensing

When a light beam passes through a massive star (or black hole), its path is curved due to the gravitational field. This phenomenon is known as "Deflection of Light" [23]. According to general relativity [1], it is resulted from the curvature of spacetime. However, based on Yangton and Yington Theory, it is caused by the large wavelength and slow light speed due to the enlargement of Wu's Unit Length in massive gravitational field [24]. Just like the light beam passing through a transparent material such as water, the light is refracted because the reduction of the light speed. The massive star works like a telescope, the deflected light beams from a star (light origin) behind the massive star can be focused into several images such that a clear picture of the star can be observed and the distance of the star and the mass of the star can be calculated. This is called "Gravitational Lensing" [25].

X. Gravitational Redshift and Cosmological Redshift

According to the Acceleration Doppler Effect, Doppler Redshift occurs whenever a star (light source) moves away from the observer (reference point) on earth at an acceleration speed. There are two other Redshifts in the universe. Gravitational Redshift [15] [26] can be observed for a photon emitted from a star of massive gravitational field. Also, Cosmological Redshift [15] [27] can be observed for a photon emitted from a star of several billion light years away. Gravitational Redshift and Cosmological Redshift both occur because of the large wavelength due to the large Wu's Unit Length generated from massive star or ancient star based on Wu's Spacetime Shrinkage Theory regardless of light speed.

XI. Conclusion

The purpose of this review is to give a sound answer to the question "What If Light Speed Is Not Constant". Based on Photon Inertia Transformation and Yangton and Yington Theory, Equation of Light Speed is proposed, such that Doppler Redshift can be explained by Acceleration Doppler Effect, and Event Horizon can be interpreted by the competition between Absolute Light Speed and star acceleration speed. Both of them can also be considered as the nature proofs of that light speed is not constant. In addition, if light speed is indeed constant, then interference shall be found in Michelson Morley Experiment even Aether doesn't exist. On the contrary, if light speed is not constant, then Einstein's Special Relativity shall not be true simply because of the wrong assumption, and Velocity Time Dilation cannot be true either. Furthermore, for the same reason, relativism could be totally false and Length Contraction could be induced from human's visual memory instead of Special Relativity.

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