

Why there is An Absolute Constancy in the Speed of Light

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Abstract: *Two most influential theories of twentieth century that completely changed the traditional Newtonian view of the space and the physical time. These two most influential theories are Einstein's General Theory of Relativity and the Quantum Mechanics. At the beginning of twentieth century, these two physical theories are formulated. Almost one hundred years to be passed since these two theories are formulated, and still we are trying to incorporate these two theories with some other ingredients to form a unifying theory- The Theory of Everything that can describe all possible observations of the physical Universe. While the General Theory of Relativity predicts that the four dimensional space-time is not flat and the physical time has a shape; the distribution of matter and energy in the Universe curves or wraps the four dimensional space-time. The celestial bodies try to follow the straight line paths but because the space-time is not a flat, the bodies' paths appear to be bent. It also predicts that gravity is distortion of the space-time due to uneven and irregular distribution of matter and energy. It already been discovered that light does not reach to observers instantaneously; rather it travels at a certain fixed speed of 186,000 miles per second or 300,000 kilometers per second which is an absolute constant, no matter at what speed the observers or the source is moving at, the speed of light is always the same to an observer, an absolute constancy it has. How this can be an absolutely universal truth? The General Theory of Relativity also predicts that the speed of light is the universal speed limit of the Universe, which in fact means that nothing can exceed the speed of light. Then, what are the reasons or causes of the speed of light to be at absolute constancy? The Universe must be very fine tuned to deal with all constants to diminish the uncertainty principle to have one and unique history and also one and unique future as counter part of one and unique history. The independency of the source or the observers and an absolute constancy of the speed of light are supporting the concept of the unique history and unique future. Thus, dealing with constants indicates the prediction of determinism is absolutely valid because God does not play dice.*

Keyword: The general theory of relativity, Quantum Mechanics, Uncertainty Principle, the universal speed limit, the theory of determinism

1. Introduction

It is nothing wrong to assume of a digitally coded world or rather the Universe. If the Universe is of all constants, all human psychologically recognizable events can be digitally coded to either zero (0) or one (1) and there is nothing in between. It is because all constants are fully decisive, they are like either yes or no, either null or full, and there is nothing in between them [1, 2]. All constants are like a switch, either an on or an off. A unique past and a unique future supports events with psychologically full comprehension are all digitally coded decisive events, at least within our psychological comprehension reach or limitations. The human psychologically less comprehensive or incomprehensive events are all outside of psychologically comprehended or rather outside of the boundary conditions of psychological limitations. Thus, the solution depends on rather the probability [3, 4] or in fact, uncertainty conditions [5, 6]. A particle can be either in one place or in another place [7, 8]. It cannot be half in one place and the rest half in another place or cannot be at two places at the same physical time. Similarly, an event like landing of satellite or astronaut on the moon or mars cannot be half taken place. It is either taken place or it has not [9, 10]. It is more like that one cannot be slightly dead or slightly pregnant either. As due to causality [11, 12] (It is the cause and effect relationship of successive psychologically recognizable events is called the causality), we cannot change past, the same way, due to anti-causality (anti-causality relates future to be responsible for the present and past is the way these are) we cannot change future too. Causality prevents to penetrate the past which means that the past cannot be altered or modified, so the past is fully preserved and protected by causality. Similarly, due

to anti-causality, future is responsible for the past the way it is. Present is an abstract idea, psychological interaction with the physical time can be termed as present. If past stands uniquely defined due to causality, it is because future stands uniquely defined too due to anti-causality. If future would not be there, past would not be there as well and vice versa which means that they are mutually dependent and related to each other and they are linked by the abstract psychologically interacted present; they are mutually responsible for each other's existence. If past is causally related to future, similarly, future is anti-causally related to the past. Thus, future is responsible for the past, the way it is. If cause relates effect, the effect relates cause too. So, a system can have only single definite history and a single definite future too. The Universe is all about dealing with constants, a single definite result possible like the speed of light as an example. Because all are constants, it is simple and easy to deal with them, only need full psychological comprehension about the events. Thus, constants evolved from decisive events, and they are very often around us and they also are not greatest mistake of life, unlike the Einstein's Cosmological Constant which he termed as the greatest mistake of his life [13-15] is actually introduced by him to assume a static Universe, it would be better without cosmological constant to assume an expanding universe which is a very recent conclusion about the present state of the Universe [16, 17].

2. Why is the Speed of Light is at Absolute Constancy

Declining the traditional view of light, recent development is that light does not travel instantaneously from the source to

the observer, it is rather has an absolute constant speed – 186,000 miles per second or 300,000 kilometers per second independent of the movements of the source and the observer [18, 19]. Now, the question is why the speed of light is independent of the movement of the source and the observer [20]. Because all bodies of our Universe has positive mass [21-23], light never travels in a straight line due to gravitational force exerted from the source as well as the observer. Light always curved from the source to the observer. As the light curved to the observer, it takes little longer time to reach to the observer. So, for observer, it feels to him that the physical time runs slower. The observer cannot recognize the curved path; it seems to him that light travels in a straight line. If both the source and the observer would have zero masses, then would have zero gravity too, light would be in a straight line which is the straight line distance between them. Let, the straight line distance = D and time taken to travel light to the observer in a straight line = T. Then the speed of light,

$$C = \frac{D}{T} \quad (1)$$

If both the observer and the source have masses, the light path curved with a distance $D' > D$, and time taken $T' = T + \tau$ where τ is the amount of physical time slow down for the observer due to the masses and thus due to gravity exerted by both. Then the speed of light-

$$C = \frac{D'}{T'} = \frac{D'}{T + \tau} \quad (2)$$

Case-1:

The source and observer is moving towards each other. Let, at a particular time, the distance is reduced from D' to D'' by an amount d' , time taken is reduced, due to reduced distance, from T' to T'' by an amount t' and due to movement both the source and the observer have more effective masses, due to that time gets more slow down to observer from τ to τ' , then the speed of light is-

$$C = \frac{D''}{T'' + \tau'} = \frac{D' - d'}{T' - t' + \tau'} \quad (3)$$

From equation (1):

$$\frac{D'}{T'} = \frac{D' - d'}{T' - t' + \tau'}$$

$$\text{Or, } D'(T' - t' + \tau') = T'(D' - d')$$

$$\text{Or, } D'T' - D't' + D'\tau' = T'D' - T'd'$$

$$\text{Or, } T'd' = D't' - D'\tau'$$

$$\text{Or, } T'd' = D'(t' - \tau')$$

$$\text{Or, } \frac{d'}{D'} = \frac{t' - \tau'}{T'}$$

$$\text{Or, } \frac{D'}{T'} = \frac{d'}{T' - \tau'} \quad (4)$$

As more speedy they approach to each other, the τ' increases more, T' is a constant, will be the same. To incorporate increased τ' , d' gets reduced, which is more

curved (D'' over D'). As the straight line distance between the source and the observer decreases, the light path is more bent to have the same light path. So, for the observer, it seems that the physical time runs slower and slower. The light path makes all the difference to the observer to feel about the speed of physical time.

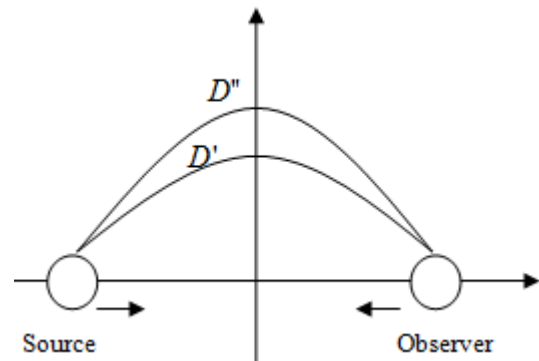


Figure 1: Source and observer is moving towards each other

Case-2:

The source and observer is moving away from each other. Let, at a particular time, the distance is increased from D' to D'' by an amount d' time taken is increased from T' to T'' by an amount t' and due to movement both source and observer have more effective masses, due to that time gets more slow down to observer from τ to τ'' , then the speed of light remains the same.

$$C = \frac{D''}{T'' + \tau''} = \frac{D' + d'}{T' + t' + \tau'} \quad (5)$$

From equation (1):

$$\frac{D'}{T'} = \frac{D' + d'}{T' + t' + \tau'}$$

$$\text{Or, } D'(T' + t' + \tau') = T'(D' + d')$$

$$\text{Or, } D'T' + D't' + D'\tau' = T'D' + T'd'$$

$$\text{Or, } T'd' = D't' + D'\tau'$$

$$\text{Or, } T'd' = D'(t' + \tau')$$

$$\frac{d'}{D'} = \frac{t' + \tau'}{T'}$$

$$\frac{D'}{T'} = \frac{d'}{T' + \tau'} \quad (6)$$

As more speedy they are away from each other, the τ' increases more, T' is a constant, will be the same. To incorporate increased τ' , d' gets increased, which is less curved (D'' over D'). As the straight line distance between the source and the observer increases, the light path is less bent to have the same light speed. So, for the observer, it seems that the physical time runs slower and slower. The light path makes all the difference to the observer to feel the speed of the physical time. As the distance increases it took light to travel greater distance and thus, need more time as well.

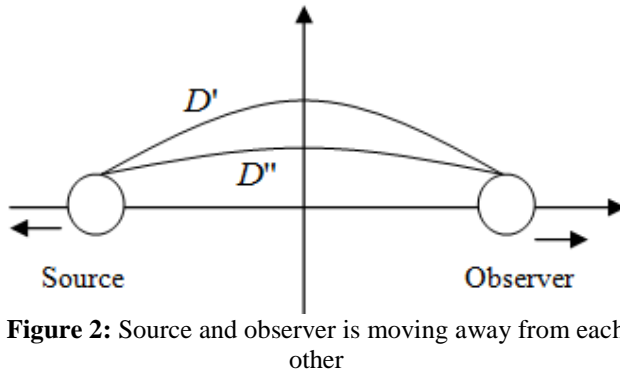


Figure 2: Source and observer is moving away from each other

Case-3:

The source and observer is moving in the same direction towards each other. If the source is moving slower than the observer we can adopt similar mathematics as in case-2 and if the source is moving faster than the observer we can adopt similar mathematics as in case-1. In any case, due to movement, their effective masses increase and effective sizes decrease, thus their gravity also increases in proportion to increased masses which makes observer feel that the physical time runs slow again because the light path bent slightly due to motion in either direction. The faster the observer are moving away, the less the light path bent (case 2) and also light has to travel more distance with the speed of 300,000 kilometer per second, thus need more time to reach. If the source is moving faster than the observer, the light bent is more. In any case, the bent path of light, the decreased size, the increased or decreased distance, and the slowness of the physical time for observer are so fine-tuned to meet the constancy of the speed of light to be 300,000 km per second. Thus for the observer, it looks like the speed of light is the same all the time. Thus, the faster they move away from each other, the light path is less bent (D' compared to D'') due to motion in which observer is faster than source. When the source is faster than observer, the light path is more bent (D'' compared to D'). Thus, light speed is actually independent of the source and observer.

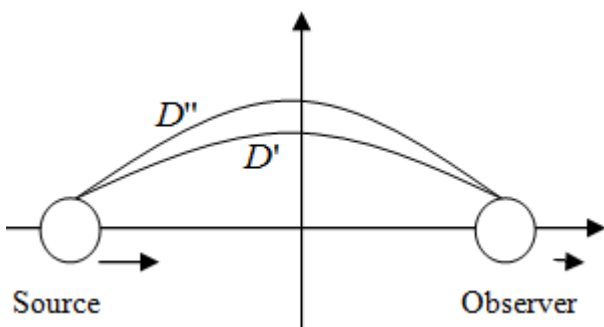


Figure 3: Source and observer is moving in the same direction

If the source and observer are moving on the same direction, due to movement, their effective masses increase and their sizes decrease, thus their gravity also increases in proportion to the increased masses which makes observer feel the physical time runs slow again because the light path bent slightly due to motion. Let, the effective total mass increased

from $M = m_1 + m_2$ (where m_1 is the mass of the source and m_2 is the mass of observer) to $M' = m_1' + m_2'$, (where m_1' is the increased mass of the source and m_2' is the increased mass of observer due to motion), where $M' > M$. Then,

$$M \propto \tau$$

$$\text{Or, } M = K\tau$$

$$M' \propto \tau'$$

$$\text{Or, } M' = K\tau'$$

Where τ is the amount of slowdown of the time due to mass M and τ' is the amount of more slowdown of the physical time due to increased mass M' due to motion (note that all the time the constant is K only, which is an absolute constant)

If the observer moves faster than source, the light path will be less bent (D'), because the distance from the source is increasing. And if Source is moving faster than the observer, the light path will be more bent because the distance is decreasing (D''). The bent path of light, the decreased size, the increased or decreased distance, and the slowness of the physical time for observer are so fine-tuned to meet the constancy of the speed of light to be 300,000 km per second. If both are stationary to each other, the light path bent will be compensated of the slowness of time for the observer. If it would be that both were at absolute rest with zero mass, then light path would be a straight line and there would not be any slowness of time for observer. So, the amount of slowdown of time is no more an observer dependent fact, rather it feels to observer that time slows down which due to more bent of light path.

3. Conclusion

The speed of light is always a constant at 186,000 miles per second or 300,000 kilometer per second. The change in masses due to the motion of objects makes the distortion of the light path to be positively curved. The curvature is directly proportional of the increase of effective masses. Thus, the speed of light is independent of the motion of the source and the observer. The light path will always be bent when bodies are in motion due to increased masses of both the source and the observer. The light path would be negatively bent for anti-particles and for anti-universe as well. The light path is positively bent for us because the bodies are all made of positive matter of our Universe, thus, gravity is always attractive due to all positive masses. The reason why all light-bents are positive and they occupy the upper half of the X axis in an X-Y plane. Thus, we can conclude that the speed of light always has an absolute constancy value: 300,000 kilometers per second or 186,000 miles per second and it is completely independent of the speed of source and the observer- it has an absolute constancy in terms of speed of light is concern.

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