Light Speed Cannot be a Universal Constant

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Abstract

That motion is relative is an accepted physical principle as everything is in motion relative to some other thing in the universe. The rule of additive relative velocity is based on this simple principle. If the speed of light as measured on the ground is c, then the velocity of light as measured by an observer moving at speed w towards the source would be $c + w$. There is no need of any experiment to confirm if indeed the speed would be $c + w$ as it is simply the speed that would result following the accepted practice of how physical measurements of distances and time are made - speed is just distance divided by time.

1 Speed of Light Additive with Observer Speed

Einstein's relativity theories, both special relativity and general relativity, are founded on the postulate that the speed of light is a universal constant. If the speed of light is not a universal constant, then both relativity theories had to be rejected. This short article shows, rather trivially, that the speed of light cannot be a universal constant thus repudiating the relativity theories. The speed of light, just as with every measurement of any speed, conforms to the rule of addition of relative speed. If a source of light is measured to have a speed of c relative to the ground, then for an observer that moves towards the light source with a speed of w relative to the ground, the speed of light would have a speed of $c+w$ relative to the moving observer - contrary to the postulate of special relativity. Is there any need to verify experimentally that the speed would indeed be additive and would turn up as $c + w$? The answer is: No!

Let's take an experiment that measures the time light takes to traverse two points A and B on the ground and it is t sec. If there is another point C on the ground giving a line ABC where AB = BC. If we need the time light would traverse the distance BC, is it necessary that another independent experiment had to be done to determine a value? No! The answer is the same t sec and no one would argue that another independent experiment is needed. Similarly, concerning the speed of $c+w$ for light, there is no need of another independent experiment to confirm it is correct; it is how the speed would turn out to be based on how distances and time are measured with our accepted practice.

2 The Covenant of Physical Reality

Physics can only be done if there is an accepted system of physical measurement based on defined standard of units and the way physical measurements are implemented in practice. For measurements in space and time, the following are necessary:

1. an accepted space coordinate system.
2. an accepted mathematical representation for time.
3. standard of units for distance - the meter.
4. standard units for time - the second.
5. universally synchronized clocks for all observers.
6. accepted practice of measurement implementing the standards of 3), 4) and 5) above.

The science of physics cannot exists if any of the above conditions cannot be met and satisfied. The fact that physics is still being practice means that all of the conditions above have been satisfied - wherever the above have been put into practice.

If the above system of measurement has been satisfied, then any measurement of distance and time would be what we called physical distance and physical time. The word "physical" here is what is meant by physical reality in physics. What the above system implies is that the meaning of physical reality in physics is based only on an agreed upon practice. There is no objective absolute physical reality - if there were such a reality, it would be unknown to physics. ***Physical reality in physics is founded only on a covenant of physical reality***. Any purported measurements of distances and time that fall outside of an accepted practice may also be called "physical reality", but then, if need be, we have to be careful to distinguish between different, and probably incompatible, "physical realities".

3 Space Coordinate System and Measuring rods

A means to identify positions in space is fundamental to physics. The space adopted in classical physics is the absolute 3-dimensional Euclidean space of Newtonian mechanics. Before the twentieth century, this was the only mathematical space to model our real space; no one has attempted to use any alternative space until Einstein's relativity theories which are based on Minkowski's spacetime. For more then two thousand years since the time of Euclid, Euclidean space and geometry was the only natural way to model space. The reason is simply because it is the only space that is commensurate with the innate faculties of man. Man knows the straight line. From the one dimension it could easily be extended to the 2-dimesnion of the plane and then to our well known 3-dimensional x-y-z Cartesian coordinate system.

Anyone in the universe could set up his own Cartesian coordinates - whether he is moving and in whatever manner he is moving. With the coordinates, all of space within the universe could conceptually be measured. A car moving along the highway may set up its coordinate system and such a moving coordinates system may also be used to identify fixed positions on the ground. The method is conceptually simple - by just plain "reading off" of positions in the moving coordinates at the moment of interest in time. A method that may be conceptually simple, or even technically crude, in no way imply that the method of measurement is flawed and therefore technically invalid. How such measurements may be be made is a technically issue outside of the purview of physics theory. With our Newtonian system of physical measurement, any moving coordinate system - moving in whatever manner - may be used to identify positions fixed in any other coordinate system; it is unlike special relativity where moving coordinates system measuring positions on the ground would cause space metric distortions.

If a car approaching mine travels at a speed of v and my car is running at a speed of w, then a little mental arithmetic would tell me that the oncoming car has a speed of $v + w$ as measured in the coordinates of my car. Now if $v = c$ - meaning the car is approaching at the speed of light - would the rules for additive relative speed magically change so that the relative speed becomes a universal constant c and not $c + w$. No! The car approaching me would still be $c + w$ according to same formula of $speed = v + w$. But there is a catch.

3.1 Measuring Rods Do Not Match

In ordinary life, most of us would not concern ourselves with standard measuring rods like a prototype for the standard meter. Even the positions and speed piloting an airplane would be available and we simply trust that the plane's control panel is working and all readings are trustworthy.

Suppose we have two spacecrafts and each has a standard meter rod and both travel at near the speed of light c and they make a flypast of each other - but too near a black hole. At the moment of flypast, they each put out their standard meter rod to compare; they found that the rods no longer match! One is appreciably longer than the other. When this happen, the use of rigid rod prototype to define the standard meter breaks down. Does it mean that all our physics that relied on our accepted measurement system have to be rejected? No!

A theory of physics is independent of the way of implementing the measurement of distances (as well as time). A physics theory is based only on the space adopted in which to examine physics. How distances are measured implementing the mathematical model of space is a wholly technical issue outside of the purview of the theory. If we assume that the standard meter is defined in the crude manner using a rigid rod prototype, then the possibility of measurements becoming inconsistent may be real as we may not know how traveling at speed near that of light in different regions of the universe may cause rigid rods to deform due to physics that may yet be unknown to us. If it happens, then the issue is simply one of finding an alternative to define the standard meter - a technical matter that has to be resolved. In the case of our spacecraft's example, it does not imply that "length contracts" as in the manner predicted by special relativity - length contraction of special relativity is strictly space distortion.

3.1.1 Space Neither Contracts nor be Curved

The space that we started off with is the 3-dimensional Euclidean space. It is an abstract mathematical construct - meaning actually existing only as a concept in the mind. What is formed in the mind cannot be distorted or "curved" simply because we travel near the speed of light or too near a black hole and observe that standard rods do actually get distorted. A straight line of our x-coordinate axis may still be extended to the edge of the universe and it would still be as straight as ever. But putting into practice how to go along our x axis to measure the nearest star would still be a huge challenge - a technical challenge; but there is nothing which suggest any deficiency in our theoretical framework for physics.

4 Mathematical Time, Clocks and Synchronization

The mathematical construct for time in physics is the field of real number - the simple real scalar. Whenever there is need for time measures in physics, we simply introduce the required variables $t_{0,}t_{1,}t_2$... These start off as only pure scalars without any physical units. Only through associating the variables with real physical clocks would they acquire the units of second - they become real physical measures.

Any coordinate system (observer), in whatever manner of motion, may be conceived to have coordinate clocks at every points of interest where an event is to be timed. In Newtonian mechanics, time is taken to be absolute and universal. What this means is that we have to have clocks for every coordinate frames to be all universally synchronized - such a system of universally synchronized clocks has to be a given in order that physics may be developed. But implementing such a system and the manner of making use of the clocks to measure time is again a technical issue outside of the purview of physics theory. Details on how such a system of coordinate clocks may be defined and used could be found in my other article.[1]

5 Measuring the Speed of Light

Let's first consider measuring the speed of cars on the roads. There should not be arguments here as it is so simple that we do better relying on the speedometer in the car's dashboard. If an oncoming car travels at a speed of v and our car is traveling at a speed of w, again there would not be arguments that the relative speed of the cars is $v + w$; the value would be accepted without even a need for any experimental verification. But if we put in real figures for the speed, $v = 0.75c$ and $w = 0.75c$, then people would sit up if we tell them the cars travel at the speed of $1.5c$ relative to each other - cars that travels at $1\frac{1}{2}$ times the speed of light! With the relativists, they would revolt en masse.

Why is that it is not an issue to apply the formula $speed = v + w$ when cars travel at familiar speed, but it becomes an issue when the speed involves are near the speed of light? It is just plain human psychology. The method of computing speed relative to a moving reference frame that establishes the rule for addition of relative speed does not place a limit on the range of speed within which the rule applies - it applies for speed of any magnitude. If the problem is set as a test question for sixth graders, probably many would just add up the two $0.75c$ and write the correct answer : $speed = 1.5c$ and get full marks for it. On the other hand, the highly qualified relativists would be stumped and confused for an answer where sixth graders dare to go and do!

Adding more difficulty this time by actually measuring the speed of light, a light signal is sent from a point A to a point point B on the ground and its speed is measured to be c. If our car is traveling towards the light signal with a speed of w, what is the speed of light as measured by the driver? Of course, the speed would be $c + w$; there is not even a need for any experimental verification. The rule for addition of relative speed has been developed to apply for measuring any speed - not just the speed of slow moving "non relativistic" cars. ***The rule applies even for measuring the speed of light relative to a moving observer!*** No magic is involved! And the speed is given by the formula $speed = c + w$.

The speed of light is not a universal constant.

All coordinate systems are abstract and they do not misbehave and distort just because there is a change of things being measured or that the speeds are near that of the speed of light. The formula $speed = c + w$ applies even in the case for measuring the speed of light relative to a moving observer. If $w = 0.5c$, then the speed of light measured by the moving driver in the car would be $1.5c$. ***But this speed of light of 1.5c is valid only in the world of Newtonian physical reality!*** We cannot comment on the speed if others implement a different world of physics with a different "physical reality".

6 Conclusion

Contrary to the postulate of special relativity, the speed of light cannot be a universal constant. The speed of light obeys the rule for addition of relative speed. The speed of the observer may be added to the speed of light to give a speed different from what is measured by a stationary observer. That the speed of light is not a universal constant unequivocally repudiates Einstein's relativity theories, both special relativity and general relativity.

References

[1] Chan Rasjid, Physical Reality has only Absolute Space and Time; http://vixra.org/abs/1508.0108