

Explaining the Speed of Light for Sweet Little Gwen

"If a cluttered desk is a sign of a cluttered mind, of what, then, is an empty desk?" - Albert Einstein (1879 - 1955)



Note: The following arises from a sweet little girl's question as to what is the speed of light and my answer in return:

Dearest Gwen!

What is light? What about the speed of light?

Gwen, this is some deep stuff.



The points however are these:

1). the speed of light is a universal constant, no matter where you measure it -- here, there or at infinity, and notwithstanding your speed relative to anything else. But, for this measurement to be constant it is always taken or measured within a pure vacuum ... that is, no nothing. No air, no matter, no nothing. Otherwise, light is bent, distorted, and even slowed down as to what a rainbow or a prism shows when other matter is present.

2). the speed of light is never a vector which has speed and direction. Light travels as a "sphere of light" from any [infinite] source(s) of the light. Therefore, there is no unique source for light, except when we restrict a beam of [laser] light. A vector such as velocity has both speed [magnitude] and direction. A force is a vector. Acceleration is a vector. All these concepts are concepts of vectors.

Light, however, is omnipresent and therefore has no, one unique source. It's everywhere! Unless we start to restrict it such as in a flash light, laser, etc.

3). finally, and this is the really, really difficult idea: we all live in a world which essentially exists at the "surface of a sphere of light", emanating from who knows where. The infinitely expanding "surface" of the sphere of light which is unique to each and every one of us is our unique, personal "present time", which is called "proper time". Every other piece of matter or body also possesses a unique, personal [if a body of matter can be personal -- no joke here] "proper" or present time. Therefore, a subatomic particle or large body such as earth has a unique proper time "attached" to it.



Hence we only "know" time because of light ... so therefore light is integral to time, no doubt. Without light, there is no time. And no velocity. And no distance. No space. In fact, no physics. Etc. Period!!

But light travels at a finite speed.

Sometimes slower but never faster than its upper limit in a pure vacuum, designated as c , coming from the Latin celeritas, meaning swift, fast.

Therefore, because light has a definite upper limit to its speed, there are things out there in space about which we still do not know. The light hasn't yet reached our eyes. So this unknown region of space, actually spacetime, is also called "Elsewhere". And because some of whatever energy is producing a particular amount of light, that energy may or may not bring about human awareness as to its existence. Such is the meaning of "Elsewhere". Some region of spacetime beyond our awareness because of the finite speed of light coming to our eyes. Get it? Contrariwise, if the speed of light were instantaneous or infinite, then there would be no "Elsewhere" and what follows in the next paragraph would be untrue.

Here's another way to look at it: if a body of mass were to travel faster than the light emanating from it, the body of mass would be invisible! It would surpass its own light! It would be even beyond pure energy, in other words. Nothing therefore can exceed the speed of light. Period. End of this discussion!

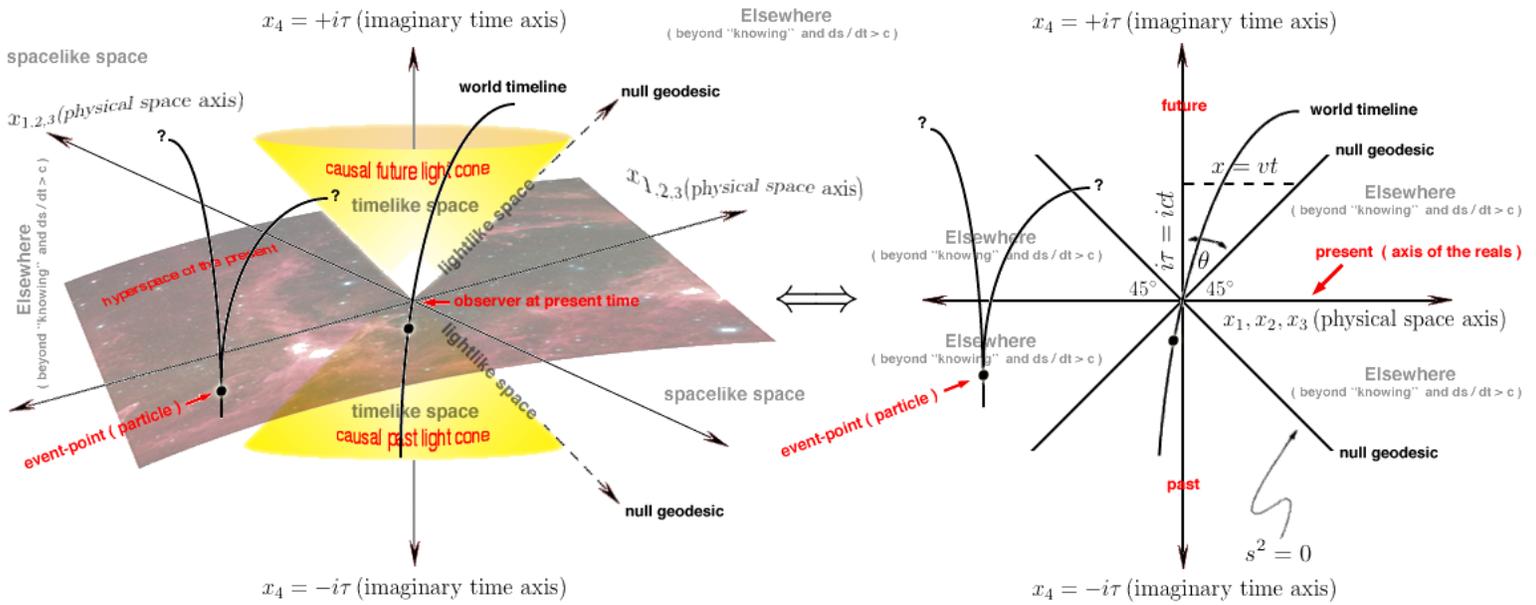
Continuing ...

But, for that energy out there which does come into our "proper [immediate present] time" of knowing, and because light travels at a definite speed, the ratio of v/c -- velocity of something real in the world to our experience divided by the speed of light -- has an upper limit: that is, $v = c$!! Which when we divide v by c where $v = c$, produces in trigonometry an angle of 45 degrees!! That is, trig tells us that in a $45^\circ - 45^\circ - 90^\circ$ right triangle when we set $v = c$, that **the absolute upper limit of our "light cone of knowing"** as between the physical world we presently experience [proper or present time] and the speed of light, **is limited to 45 degrees!!** Outside of this 45 degrees between v [velocity of something real to our experience] and c , finite speed of light, is "Elsewhere" in spacetime!!

Difficult stuff I know.

Well, perhaps not the "Elsewhere" thing.

But the "45 degree trig thing" is better shown on a piece of paper or in Relativity Science Calculator at the chapter for "Proper Time".



$$|\tan \theta| = \frac{|vt|}{|ict|} = \frac{|\frac{v}{c}\tau|}{|i\tau|} = \frac{|\frac{v}{c}||\tau|}{|i||\tau|} = \frac{|\frac{v}{c}|}{|i|} = \frac{|\frac{v}{c}|}{1} = \left|\frac{v}{c}\right| = \frac{v}{c}$$

Fondest affections!
 The Dr DonZi
contact@relativitycalculator.com
<http://www.relativitycalculator.com>