

Re: SR paradox – help!

Source: <http://sci.tech–archive.net/Archive/sci.physics.relativity/2005–02/1431.html>

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Date: 02/06/05

Date: Sun, 06 Feb 2005 19:52:56 GMT

"The TimeLord" <mathnphysics–not@hotmail.com> wrote in message news:110bjhdbjloss1f@corp.supernews.com...

> *First of all, my apologies to DavidBowman for sending my response by email.*

> *I meant it to go to the NG, but before I realized what was happening, my OS*

> *had already done the dirty deed. (Obviously my return address is munged, because I've had too many offers from some people to go chase their favorite UFO.)*

>

> DavidBowman <dt041054@yahoo.com> wrote on Saturday 05 February 2005 20:15 in

> <1107656113.150788.52320@c13g2000cwb.googlegroups.com> posted to sci.physics.relativity:

>

>> *This question was inspired by a single sentence in a post by Kenseto to prove his aether theory. He got the tongue–lashing he deserved... but the problem still haunts me.*

>

> *Sorry I missed the original thread; it must have been interesting.*

>

> [...]

>> *The Bureau of Standards sets up two identical beacons. The one on earth fires an omnidirectional radio pulse. When that energy reaches the moon one second later, it's twin beacon on the moon detects it and fires another omnidirectional burst.*

>>

>> *One second after that, the radio pulse from the moon reaches earth and is detected by the earth beacon which fires another omnidirectional blast ...and so on.*

>>

>> *Each beacon is triggered by the other, and alternately fires a radio pulse every two seconds. So a guy on Mars hears a "click" on his radio receiver at one–second intervals.*

>>

>> *So far, so good.*

>>

>> *BUT:*

>> *A guy in a spaceship moving .999c must also hear the same clicks at one-second intervals, since we all agree that the earth-moon distance is one light-second, and c is the same for everybody.*

Why should the guy in the spaceship hear clicks at one-second intervals?
There is a relativistic Doppler shift between him and the source.

>

> *Yes, c is the same for everybody. However, the underlying "essence" of SR is*

> *that things that are simultaneous in one frame are not necessarily simultaneous in another. If you work through the twin-paradox problem, the solution is actually that for the Earth-bound twin, the clock on the spacecraft has run slow, but for the spacecraft-bound twin, it's the trip that has been shrunk. That fact can be easily shown from the Lorentz transformation.*

>

>>

>> *The problem is that this gizmo can be used as a universal time standard -- literally. Everyone in the universe can listen to the master clock*

>

> *Mmmmmm. Gotta be careful with that one. At face value, what you say is correct, but knowing some of the types on the internet, it will be promptly taken out of context, misapplied and then used and abused to "prove" SR wrong.*

>

>> *ticking away once per second, no matter how fast they're moving -- including the two guys in the twin paradox.*

>

> *However, the "ticking away once per second" is a type of frequency that is measured in the rest frame of the Earth-Moon system. For the guy going 99.9%c, the period of the ticks will undergo time dilation.*

>

>>

>> *The only way out I can see is if time dialation causes the guy in the spaceship to observe a light pulse travel from the earth to the moon in an arbitrarily short time, limited only by how fast his rocket can go.*

>

> *If $f_0 = 1 \text{ Hz} = \text{frequency in Earth-Moon system (rest)}$*

> *$= 1/T_0$*

> *and $f = \text{frequency of guy going } 99.9\%c$*

> *$= 1/T$*

> *then $T = 1/f = T_0 * \text{Sqrt}[1 - 0.999^2]$*

> *$= 1/f_0 * \text{Sqrt}[1.999e-3]$*

> *then $f = f_0 * 1/0.0447$*

> *$= 22.37 * f_0$*

>

Can this be correct? According to relativity, it is the clock which slows down, along with all physical processes that occur. Shouldn't the time between ticks appear to be stretched, and the observed frequency be lower? If we extrapolate this line of reasoning to a relative velocity of c , then when clocks freeze, frequency would seem to be infinite. It takes 22.37 seconds of the traveler's clock before 1 second elapses of the earth–moon clock. This is the same prediction that an earth observer would make about the traveler's clock. To get a frequency of $22.37 \times f_0$ implies counting ticks in one frame and measuring time in the other.

> *So the guy at 99.9% c sees 22.37 ticks per second, regardless of the*
> *directions of his travel due to time dilation. This is different from the*
> *Doppler shift in the carrier frequency, would be blue shifted if he is*
> *going toward Earth and red–shifted if traveling away. The distinction*
> *between the two is due to the way time dilation results and the*
> *definitions*
> *work in one case and the fact that Doppler shift depends on the wave*
> *nature*
> *of light in the other case.*
>
>>
>> *But if that's the case, you can get superluminal communication,*
>> *because:*
>>
>> *1) you can make radio travel from the earth to the moon in an*
>> *arbitrarily short time, and*
>
> *[smile] No that does not follow. The signals still travel at speed c . Due*
> *to*
> *the velocity–addition formula, they are still limited by c .*
>
>>
>> *2) the space ship is a finite number of earth–moon distances away.*
>
> *[big smile] Zeno's paradox eh? As I recall, Achilles won the race anyway*
> *and*
> *didn't loose until he went to Troy. – Seriously, FTL signaling still*
> *doesn't follow from that.*
>
> --
> *// The TimeLord says:*
> *// Pogo 2.0 = We have met the aliens and they are us!*
>