

Re: Anyone want to have fun with time dilation calculations?

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- *From:* The Ghost In The Machine <ewill@xxxxxxxxxxxxxxxxxxxxxxxxxxxx>
 - *Date:* Wed, 08 Feb 2006 15:00:17 GMT
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In sci.physics, Spaceman
<Realspace@xxxxxxxxxxxx>
wrote
on Tue, 7 Feb 2006 16:20:29 -0500
<RdqdnYdeGLGJknTeVn-oA@xxxxxxxxxxxx>:

Please figure supposed actual speeds if using time dilation
if you dare.
:)

0.999c = what speed according to time dilation?

0.7c = what speed according to time dilation?

0.5c = what speed according to time dilation?

0.3c = what speed according to time dilation?

0.1c = what speed according to time dilation?

OK, follow along closely.

O and A are the customary two observers. O has a small steady light (about LED or peanut bulb size, maybe; it doesn't matter too much). A has a rod, $L=1$ meter in length. A knows this rod is 1 meter in length because it's actually a meter-stick, a common appliance in the more intelligent countries, presumably. (It's marked off in centimeters and maybe millimeters; yardsticks in slightly less intelligent countries are marked off in maybe 1/16th inch increments. But I digress.)

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A also has a small mirror affixed to the end of his rod. This mirror is mounted at a 45 degree angle so that A can see the light as the rod passes over it.

A diagram of course in ASCII is problematic, but here's an attempt:

L
A: v <= T-----\

O: *

A also has a sophisticated timer unit (T) mounted at the other end of the rod. This unit will measure the difference in time between the light passing under the timer, and the light reflected by the mirror on the moving rod. The velocity can then easily be measured, once lightspeed (a time factor of L/c) is taken into account.

We now move the rod over the light at a speed v , any of the speeds above. The rod will be moving timer end first.

At time $t_A = t_O = 0$ the timer starts. At time $t_{A'}$ the timer detects the lightpulse coming from the mirror and stops.

The velocity is now given by $v = L/(t_{A'} - t_A - L/c)$, since in SR lightspeed is c relative to all observers, regardless of its source. This calculation is unaffected by time dialation.

If O has a similar rod and timer unit (and furthermore both timers have light sources) his measurement of the velocity would agree with A's.

--
#191, ewill3@xxxxxxxxxxxxxx
It's still legal to go .sigless.

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