Re: The real twin paradox.

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- *From*: colp <colp@xxxxxxxxxxxxx>
- *Date*: Mon, 26 Nov 2007 11:53:01 −0800 (PST)

On Nov 27, 5:00 am, bz <bz+...@xxxxxxxxxxxxxxxxxxxx> wrote:

> colp <c...@xxxxxxxxxxxxx> wrote in news:a99bf3bb−6f11−4a6a−bfbd−
> 4c285e3b2...@xxxxxxxxxxxxxxxxxxxxxxxxxxxxx:
>
> > One could argue that switching reference frames half way through the
> > experiment is another form of misdirection.
>
> You have multiple reference frames in the problem as originally stated.
> If you want to use one reference frame through the experiment, you would do
> better to stick with the point of origin of both ships [the earth].

There would be no paradox from that frame of reference. The frame of reference which shows the paradox is that of one of the ships.

> That is because both ships accelerate several times during the experiment.
> That means that neither of them stays in the same inertial frame of
> reference(iFoR).
> This is because each CHANGE in velocity is also a change of iFoR.

That is true, but it does not change the fact that according to SR time dilation is observed when the ships accelerate and when the travel at constant velocity. Time tilation is observed on both the outgoing leg and the inbound leg.

> That means that SR will not tell us how things look from the viewpoint of
> one of the ships during acceleration.

Linear relative acceleration maps to an increase in observed time dilation.

> We can look at what happens inside the ships from the earths iFoR [ignoring the earths motions through space and considering it to be an iFoR.
> We can look at things from the viewpoint of a ship as long as it is 'coasting'.
> But if you want to use SR, You need to find a way to treat the ship as if it is inertial.
> One way to do that is to assume it instantly goes to the velocity, coasts all the way to the turn around point, then drifts home and stops instantly.
> That way each ship is in one iFoR for the entire outbound trip.
>
> At turn around you can assume it instantly reverse direction of travel.
> It is NOW in another iFoR.
>
> There is no cheating done. This is one way to approach the problem.
>
> Hint: All approaches that are consistent with SR should give similar final results, ie both travelers end up with the same number of ticks.

The number of ticks that are sent is greater than the number of ticks that are expected to be received by either ship, hence the paradox.

> The way I worked it, with the Doppler shifts and 1 second signal pulses works AND there is nothing 'odd' happening.

That is because you ignored the relativistic time dilation in your example.

> The way Dirk explained it ALSO works but things are a bit odder because of non inertial frames of reference involved.

Wrong. Dirk's description of the return leg disagrees with SR.

> It is much easier to understand if you do make all your clock observations from the Earth's iFoR.

Yes, the paradox does not occur from that FOR.

> From earths iFoR, it is clear that both clocks are 'in sync' through out
> the trip, but the clocks are NOT in sync with the earthbound clock.

Right.

> If you insist on looking at things from the iFoR of a ship, you MUST keep
> in mind that the ship changes iFoR at turn around.

That does not change the number of ticks sent or expected.

> When you do calculations of 'current' time on the other ship, just before
> turn around and again just after turn around, there are large changes in in
> the time on the other ship.

That is a hint that the situation is paradoxical.

> Your time also changes in going from iFoR_outbound to iFoR_inbound, or it
> would if you looked from one of those iFoRs the instant before turnaround
> at the iFoR just after turn around.

You mean the observed time of the other ship? How is that going to
affect the number of ticks that are sent?

> Of course, as you are using the ship's iFoR for your standard, when you
> look at the outside world, YOU see no change in your clock.
> All the changes that WOULD show up as changes in your clock get put onto
> the clocks of others.

Yes, that is a consequence of time dilation.

> As I said before, it is much simpler to look at things from the earths iFoR
> and to look at the signals from the other ship as I did.

Yes, but the paradox involves look at things from the FOR of one of
the ships.

> In any case, there is no actual paradox as long as you remember what pocket you are putting your ticks into and why.

Reality isn't paradoxical. But SR does not describe reality in all frames of reference, hence the paradox.
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