# Re: SR false?

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- *Date*: Wed, 20 Sep 2006 11:15:40 +0200

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Koobee Wublee wrote:

> Paul B. Andersen wrote:
>
>> Koobee Wublee wrote:
>>
>> I challenge you to prove that you understand
>> the very mathematics of the Lorentz transform
>> by solving the following problem:
>>
>> In a frame of reference S, a photon with momentum p is moving
>> along the y −axis. The angle phi is thus pi/2
>>
>> p
>> ^
>> | phi
>> −−−−−|−−−−−−−−−−−−−−−−−−−−−−−−−−−> x
>>
>> A frame of reference S' is moving in the x direction of S
>> with the speed v.
>>
>> p
>> ^
>> | phi'
>> −−−−−|−−−−−−−−−−−−−−−−−−−−−−−−−−−> x'
>>
>> What is the angle phi' ?
>>
>> Put up, or shut up.
>
> OK, since you insist. However, I do reserve the right to make my life
> similar that is for me to set the velocity of x as observed by x'
> parallel to both x and x' axes. The magnitude of the velocity is
> positive going from left to right. I am also defining this angle as 0
> when your angle = pi / 2. Also defining clockwise phi as positive, we
> have

phi' = − cos^−1(v / c)

Almost right.
The correct answer is phi' = arccos(−v/c) (or phi' = cos^−1(−v/c))
I will assume this is what you meant.

```
\
\ phi'
−−−−\−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−> x'
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So we can conclude that if v and p are transverse S,
they are NOT transverse in S', because the angle between
v and p is arccos(−v/c) in S'.
Conversely we can conclude that if v and p are transverse in S',
they are NOT transverse in S, because the angle between
v and p is arccos(v/c) in S.

We can sum it up thus:
If phi = pi/2, then phi' = arccos(−v/c)
if phi' = pi/2, then phi = arccos(v/c)

The general equation valid for any angle is:
cos(phi') = (cos(phi) − v/c)/(1 − (v/c)*cos(phi))
or:
cos(phi) = (cos(phi') + v/c)/(1 + (v/c)*cos(phi'))

This is aberration.

Now, if the source is stationary in S, and the observer
is stationary in S' we can conclude:

If the velocity of the observer is transverse to the wave vector
in the source frame S, then phi = pi/2, and the observed Doppler shift
will be:
f' = f*(1 − (v/c)*cos(phi))/sqrt(1 − v^2/c^2) = f/sqrt(1 − v^2/c^2)
This is a blue shift

If the velocity of the source is transverse to the wave vector
in the observer frame, then phi' = pi/2 and cos(phi) = v/c,
and the observed Doppler shift will be:
f' = f*(1 − (v/c)*cos(phi))/sqrt(1 − v^2/c^2)
f' = f*(1 − (v/c)^2)/sqrt(1 − v^2/c^2)
f' = f*sqrt(1 − v^2/c^2)
This is a red shift.

Summed up:
−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−−
# If the velocity of the observer is transverse to the wave vector
# in the source frame, the observed Doppler shift will be:

# f' = f/sqrt(1 − v^2/c^2)
#
# If the velocity of the source is transverse to the wave vector
# in the observer frame, the observed Doppler shift will be:
# f' = f*sqrt(1 − v^2/c^2)

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Since this follows from the very mathematics of
the Lorentz transform which you claim to understand,
I will assume you know this is correct.

In the case you don't agree, I challenge you to show that
the above is NOT what the Lorentz transform predicts.
General talk about symmetry won't do.
You will have to do the math.

> > > SR predicts a symmetric
> > > result where
> > > only the relative speed
> > > matters.
> >
> > Nonsense.
> > SR doesn't predict a "symmetric" result in
> > two different cases.
>
> I never claimed that.
>
> > \> Thus, you will have another
> >
> > > f' = f / sqrt(1 − v^2 / c^2)
> > >
> > > According to SR, the overall
> > > result would be the product
> > > of these two
> > > which is
> > >
> > > f' = f / (1 − v^2 / c^2)
> >
> > Nonsense.
> > There are two distinct different cases with
> > very different
> > experimental set−up, so why the hell should
> > SR predict
> > the same outcome?
>
> Because the Lorentz transform is symmetrical in
> mathematics and thus
> predicts the same outcome for the receiver and the
> transmitter.

> > Which receiver and which transmitter?
>
> It does not matter which is the receiver and which is the transmitter to the Lorentz transform.
>
> > There are two sets of them, have you missed that?
>
> No, I did not miss that.
>
> > Case #1:
> > We have an emitter A, and a receiver B.
> >
> > Case #2:
> > B, which was the receiver in #1, is now the emitter,
> > transmitting the same signal as it receives.
> > We have another receiver C.
> >
> > A and C are stationary to each other, while B
> > is moving with the speed v relative to both.
> >
> > Now you claim that because the Lorentz transform is symmetrical,
> > C must must see the signal from B Doppler shifted by the same
> > amount as B sees the signal from A Doppler shifted with.
>
> It should not be so in real life. However, under the rules of the Lorentz transform it is the case.

So you confirm your claim:
"Because the Lorentz transform is symmetrical, it predicts that C must must see the signal from B Doppler shifted by the same amount as B sees the signal from A Doppler shifted with."

This claim is falsified below:

> > The scenario bellow satisfies the above description:
> >
> > A B −> v C
> >
> > If f is the frequency of the signal emitted from A,
> > B will according to the Lorentz transform measure
> > the frequency f' = f*sqrt((c−v)/(c+v)) and thus
> > transmit the same frequency f'.
> > C will according to the Lorentz transform measure
> > the frequency f'' = f'*sqrt((c+v)/(c−v)) = f

>> Thus the Lorentz transform predicts that C measures
>> the same frequency as is emitted from A.
>> And that is also what a real experiment would show,
>> if it didn't, we would have a causality violation.

> Yes, this is true. However, this is not transverse Doppler effect.

But nevertheless it falsifies your claim:
"Because the Lorentz transform is symmetrical, it predicts
that C must must see the signal from B Doppler shifted by
the same amount as B sees the signal from A Doppler shifted
with."

>> The scenario above is obviously different from that
>> of the experiment we are discussing, because the velocity
>> of B is transverse, and not longitudinal.
>>
>> But the principle is exactly the same; even if
>> B is moving transversely will the Lorentz transform
>> predict that C will measure the same frequency as is
>> emitted from A.

> In the case of Mr. Thim's experiment, we have
>
> ** f_B = f_A / sqrt(1 − B^2)
> ** f_C = f_B / sqrt(1 − B^2)
>
> Thus,
>
> f_C = f_A / (1 − B^2)

No.

In the case of Mr. Thim's experiment, we have:

```
v
^
|
A −>p B −>p C
```

Here the velocity of B is transverse to the wave vector
(or momentum) of the radiation in the stationary frame.

Case #1:
A is the source, B is the observer.
The stationary frame is the source frame.
The velocity of the observer is transverse to the wave vector
in the source frame, and the observed Doppler shift is thus:
f' = f/sqrt(1 − v^2/c^2)

Case #2:
B is the source, C is the observer.
The stationary frame is the observer frame.
The velocity of the source is transverse to the wave vector
in the observer frame, and the observed Doppler shift is thus:
f' = f*sqrt(1 − v^2/c^2)

The Lorentz transform predicts that the two Doppler shifts
will cancel each other, and C will detect the same frequency
as is emitted by A.

> > The Lorentz transform does NOT predict the causality
> > violation you claim it does.
>
> Thus, the Lorentz transform obeys the principle of Relativity (from Galileo) but violate the causality. This is the Twin's paradox. In order to resolve this paradox, we must abandon the principle of Relativity. That means abandoning the Lorentz transform as well.
>
> > But since you obviously are completely ignorant
> > of what aberration is, an thus don't understand
> > that it is the very reason why the two Doppler
> > shift cancels, you will probably repeat your
> > mindless claim.
>
> Your cancellation method violates the very mathematics of the Lorentz transform. You are totally lost.

I challenge you to point out exactly where I got lost.

Put up, or shut up.

Paul

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