

## Re: Simple Sagnac

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*Source:* <http://sci.tech-archive.net/Archive/sci.physics.relativity/2005-08/msg00416.html>

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- *From:* "bsr3997@xxxxxxxxxxxxx" <bsr3997@xxxxxxxxxxxxx>
  - *Date:* 3 Aug 2005 21:59:15 -0700
- 

sal wrote:

> On Tue, 02 Aug 2005 21:32:21 -0700, bsr3997@xxxxxxxxxxxxx wrote:  
>  
>>  
>> sal wrote:  
>>> Thanks for the informative response.  
>>>  
>>> On Sat, 30 Jul 2005 18:19:58 +0000, Daniel Cook wrote:  
>>>  
> [ snip ]  
>>  
>> Nice web page. A very clear simple explanation of the Sagnac  
>> effect. Just a few quibbles.  
>>  
>> Your statement about the inability of Newtonian mechanics to explain  
>> Sagnac is backwards. Sagnac has often been used in this group in  
>> attempts to show that light travels at  $c+v$  or  $c-v$  in a moving frame.  
>  
> Which just shows the level of silliness in some of the arguments in  
> this group.

Oh, I see, anything that doesn't agree with your point of view is silly.

>> Why else would it take different times to go in opposit  
>> directions around the ring ;) To claim that the single clock is out  
>> of sync with itself is really grasping at straws. Some might even  
>> say that is absurd ;)  
>  
> SR is intuitively unappealing. That's not news.

What you are doing is not SR. I already provided you with one quote that said, "K' is a uniformly moving co-ordinate system devoid of rotation". What part of "devoid of rotation" do you not understand? If you look in "On The Electrodynamics Of Moving Bodies" you will find, "in a state of parallel translatory motion parallel to the axis of X" Do you understand what that is saying? Your example deviates from normal SR practice for clock sync. Two clocks resting at the same

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point are supposed to show the same time in SR. A slow transported clock is not supposed to go out of sync in SR.

- >> Sagnac does not prove SR wrong because SR excludes rotations.
- >
- > Untrue. Einstein's SR paper didn't treat acceleration, and
- > accelerated \_observers\_ are beyond the ability of SR to handle with
- > any grace, but accelerated \_objects\_ can be handled just fine in most
- > cases without stepping outside the math of SR. (If you want to be
- > nit-picky about it you need to add the "clocks postulate" to SR in
- > order to allow you to conclude anything about accelerated objects.)
- >
- > And the reason Sagnac doesn't disprove SR is that SR predicts the
- > effect, and is, in that sense, confirmed by it, rather than
- > contradicted by it. To handle it strictly within the bounds of SR you
- > must look at it from the fixed frame, but from that point of view it's
- > a trivial bit of algebra to derive the effect.

In SR all frames are equal. Here you are saying that you can do something in one frame but not the other. Why is that? Because the frames are not equal and you are not working with SR.

- >> In "Relativity" Einstein wrote,
- >>
- >> "If, relative to K, K' is a uniformly moving co-ordinate system
- >> devoid of rotation, then natural phenomena run their course with
- >> respect to K' according to exactly the same general laws as with
- >> respect to K. This statement is called the principle of relativity
- >> (in the restricted sense)."
- >>
- >> The signal is partially dragged in media for both classical and
- >> relativistic models, as it must be to agree with experiment.
- >
- > Right. Composition of velocities automatically gives partial
- > dragging. In aether theory partial dragging must be glued on somehow,
- > which is what Fresnel did, 'way back when. In ballistic theory it's
- > even harder to come up with a scenario in which partial dragging makes
- > sense.

When discussing the Fizeau experiment in "Relativity" Einstein glued on dragging by stating, "In accordance with the principle of relativity we shall certainly have to take for granted that the propagation of light always takes place at the same velocity  $w$  with respect to the liquid, whether the latter is in motion with reference to other bodies or not."

- >> That is what Fizeau proposed and verified experimentally before SR
- >> existed. The media slows the signal to less than  $c$ , but slows it
- >> less when the media is moving in the same direction as the signal.
- >> The signal cannot be fully dragged or the signal speed could exceed
- >>  $c$  in the stationary frame with a fast moving media.
- >

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- > And that reasoning leads almost directly to the Lorentz transforms and
- > the composition of velocities formula, and suddenly you're looking at
- > what's commonly called "Lorentz ether theory" in this newsgroup; it
- > has been stated many times that its predictions are identical to those
- > of SR.

The Lorentz transforms are not needed for a classical explanation, nor is LET. And the classical explanation works with absolute time, so there are no clocks going out of sync with themselves.

- > Since SR uses no "ether" one must conclude that this is another way to
- > say there is no evidence for the "ether" assumed by the so-called
- > Lorentz ether theory.

And what explanation does SR provide for how light energy gets from point A to point B?

- >> One error I noticed in your classical view of the stationary frame
- >> is that you used  $2\pi r$  for the distance traveled by the signals.
- >
- > No, I didn't. Equation (2) shows the time to go around clockwise,
- > given that the signal travels at velocity  $u(-)$  as viewed in the lab
- > frame to go around the ring that way. First line of (2):
- >
- >  $u(-) t(-) = 2\pi r - v t(-)$
- >
- > Term by term:
- >
- >  $u(-)$  is the signal speed going clockwise, viewed from fixed frame
- >
- >  $t(-)$  is the time to go from the emitter to the detector
- >
- >  $2\pi r$  is the full circumference of the ring
- >
- >  $v t(-)$  is the distance traveled by the detector in that time
- >
- > So the total distance traveled, as given in that equation, is
- >
- >  $2\pi r - v t(-)$
- >
- > which is less than the full circumference. And  $t(-)$  is time to get
- > from the emitter to detector, not time to go all the way around the
- > circle. The detector is "coming to meet" the detector in that case.
- >
- > Going the other way, it's given by equation (4), and is
- >
- >  $2\pi r + v t(-)$
- >
- > and is, of course, longer than the full circumference, because the
- > detector is "running away" from the signal in that case.

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My bad. I was looking for a rotation and did not see  $v$  as representing one.

>> That is only true when there is no rotation. On the 28th Bilge  
>> wrote.  
>>  
>> "Why not? If the ring rotates with an angular velocity,  $w$ , then the  
>> light in the direction of rotation has to travel a distance:  
>>  
>>  
>>  $s = 2\pi r + wrt_1$   
>  
> Which is exactly what I said on that page. Bilge assumed  $k=u=c$  which  
> I did not, but aside from that it's the same formula.  
>  
> Note that  $w = \omega =$  angular velocity in the fixed frame,  $r =$  radius  
> in the fixed frame, and  $wr = v$  in my formula (2). Again, it's the  
> same formula.  
>  
>  
>> Where  $t$  is the time required for the light to reach the point on the  
>> ring that it started, since the ring rotated by a distance  $wrt$  in  
>> that time. Similarly, in the opposite direction, the distance  
>> traveled is  $s = 2\pi r - wrt_2$ . The speed of light in the ring is  $v$   
>>  $= c/n$ , so it travels a distance  $s = vt_1$  in the direction of  
>> rotation and  $s = vt_2$  in the opposite direction."  
>>  
>> I'm sure the  $2\pi$  is a typo for  $2*\pi$ .  
>  
> No it certainly is not a typo. Bilge uses " $\pi$ " to mean "the symbol  
> for  $\pi$ " and juxtaposition of terms in an expression implies  
> multiplication, according to common modern usage. Bilge wrote what he  
> intended.  
>  
>  
>> The important thing here is that he included the  $wrt$  factor.  
>  
> As did I.  
>  
>  
>> Leaving out the  $+$  or  $- wrt$  is what caused your time to come out the  
>> same in both directions.  
>  
> No, it's not. It's assuming the signal moves at  $C/N$  relative to the  
> cable (rather than  $C$  relative to the fixed frame), combined with  
> vector addition of velocities, which leads to the time coming out the  
> same in both directions.

Ah, so you found your error, And I assume you will correct it on your web site :)

- > --
- > Nospam becomes physicsinsights to fix the email
- > I can be also contacted through <http://www.physicsinsights.org>

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- *Follow-Ups:*

- ◆ **Re: Simple Sagnac**  
◇ *From:* sal

- *References:*

- ◆ **Re: Simple Sagnac**  
◇ *From:* Bilge
- ◆ **Re: Simple Sagnac**  
◇ *From:* Dirk Van de moortel
- ◆ **Re: Simple Sagnac**  
◇ *From:* sal
- ◆ **Re: Simple Sagnac**  
◇ *From:* sal
- ◆ **Re: Simple Sagnac**  
◇ *From:* Daniel Cook
- ◆ **Re: Simple Sagnac**  
◇ *From:* sal
- ◆ **Re: Simple Sagnac**  
◇ *From:* bsr3997@xxxxxxxxxxxx
- ◆ **Re: Simple Sagnac**  
◇ *From:* sal

- Prev by Date: **Re: The electromagnetic paradox and our new space-time.**
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