Re: Einstein's math and physical objects

Source: http://sci.tech−archive.net/Archive/sci.physics.relativity/2005−01/2629.html

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From: jem (*xxx_at_xxx.xxx*)
Date: 01/13/05

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Date: Thu, 13 Jan 2005 09:18:27 −0500
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Harry wrote:
> "jem" <xxx@xxx.xxx> wrote in message news:7U9Fd.2$do.0@fed1read06...
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>>dseppala@austin.rr.com wrote:
>>
>>
>>>On Mon, 10 Jan 2005 09:01:49 −0500, jem <xxx@xxx.xxx> wrote:
>>>
>>>
>>>>dseppala@austin.rr.com wrote:
>
> SNIP
>
>>>>>>>>>When I don't accelerate the disks from one frame into the other, I
>>>>>>>>>follow you are saying. However, if I were to go into a lab here on
>>>>>>>>>earth where the disk has zero velocity along the x−axis (as in the
>>>>>>>>>final reference frame of the problem I posted), it is physically
>>>>>>>>>impossible for me to have the two disks more than 180 degrees out
>
> of
>
>>>>>>>>>phase without the wires crossing (touching). There is no way to
>
> make
>
>>>>>>>>>that happen. If I'm observing the wires from a reference frame
>
> that
>
>>>>>>>>>has zero relative velocity wrt to the x−axis in this problem, the
>>>>>>>>>wires must cross (touch) if the disks have 180 or more degrees of
>>>>>>>>>phase difference − that is what physically happens when we do the
>>>>>>>>>experiment here on earth.
>>>>>>>>
>>>>>>>>This is a different experiment than the original. One difference is
>>>>>>>>that in this formulation (where the wires touch), the wires also
>>>>>>>>stretch, whereas no stretching occurred in the original formulation.
>>>>>>>

>>>>>>>During the acceleration, since the two disks are accelerated in an
>>>>>>>identical fashion as measured in the original reference frame, the
>>>>>>>wires do indeed stretch in the experiment of my original post. This
>>>>>>>is per Einstein's equations.
>>>>>>
>>>>>>OK, I mis−recalled the specification, but the manner in which the
>
> disks
>
>>>>>>are accelerated isn't important, the description you gave here (where
>>>>>>the wires touch) is still different than the original.
>>>>>>
>>>>>>At any rate, you should have paid more attention to the second
>
> paragraph
>
>>>>>>than the first. The nature of coordinate transformations makes it
>>>>>>impossible for one observer to see the wires touch when another
>
> doesn't.
>
>>>>>Yes I agree that's what should occur, but the wires must cross in the
>>>>>final reference frame when a steady−state condition is achieved. This
>>>>>is a physical condition, so therefore we must get the math to agree.
>>>>>Or can you show me how to attach non−accelerated wires to the same
>>>>>points on the disks in the final reference frame in a manner that they
>>>>>will not cross. I don't see how that is physically possible. Paul
>>>>>seems to think that the wires that are accelerated lie on the surface
>>>>>of a hypothetical cylinder even after the acceleration has stopped,
>>>>>but he has not yet posted why these accelerated wires behave
>>>>>differently then wires attached to the same points of the disks in the
>>>>>final reference which haven't been accelerated.
>>>>> Unless you can explain that, there seems to be two choices left.
>>>>>Either the wires cross while the disks and wires are accelerating, or
>>>>>the analysis is wrong.
>>>>
>>>>The only thing that's wrong is your insistence that if the disks are
>>>>measured to be more than 180 degrees out of phase then the wires must
>>>>touch. That's only true when the disks are "stationary" wrt the
>
> measurer.
>
>>>As they are as measured by observers in the final reference frame.
>>>That is what I don't understand. Why do you think the two disks do
>>>not have 180 degrees or more of relative rotation angle between them
>>>as measured in the final reference frame, after the acceleration
>>>stops?
>>
>>They very well might "have 180 degrees or more of relative rotation
>>angle between them as measured in the final reference frame", but the
>>disks weren't "stationary" in this frame while the rotation was

>>occurring, so the fact that the wires don't touch shouldn't be surprising.
>
>
> I find your assumption very surprising − it's a perfectly symmetrical
> situation in the frame in which the rotational axes are resting. I don't see
> how the wires can't touch, from symmetry they must do so according to the
> laws of nature.

It's pretty clear in the case of the "rest" frame that the wires don't
touch as there's no differential rotation of the disks.

>
> The situation isn't symmetrical in the frame in which the whole set−up is in
> translation − but I can't think of what would make the wires come together
> in that frame, and misaligned on top of that...
>
>>You can specify what it is that actually happens − the disks rotate such
>>that the wires don't touch or they rotate such that they do touch. In
>>either case when the transformation equations for observers in motion
>>wrt the apparatus are applied, you'll find that all observers reach the
>>same conclusion re. touching.
>
>
> I am afraid you didn't understand the problem, for we all know that the
> transformation equations only change the mapping. If I understood it well,
> the question was if in this case that mapping is conform the laws of nature,
> as is always claimed.
>

If you really understood the character of coordinate transformations
you'd realize that if a particular description of a process satisfies
the "laws of Nature" (e.g. the description from the "rest" frame), then
the description of that process from the viewpoint of any other frame
(which is defined by a coordinate transformation) necessarily satisfies
those laws as well.