Re: The Spin Proviso to Relativity

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"Ben Bean" <kavs_delethis_@sysmatrix.net> skrev i melding
news:ktKdnS2bLsm8GurcRVn−rg@sysmatrix.net...
>
> "Paul B. Andersen" <paul.b.andersen@hia.no> wrote in message
> news:cl6d07$8jb$1@dolly.uninett.no...
> >
> > "Ben Bean" <kavs_delethis_@sysmatrix.net> skrev i melding
> news:B8SdncZcW_z2v−ncRVn−oA@sysmatrix.net...
> > > I am eager to hear wisdoms in answer to the quandary below stated.
> > >
> > > SCENARIO: You stand on a planet just like Earth, but there's no
> atmosphere.
> > > You stand on the equator and hold your hands up to the air so that they
> are
> > > a meter apart. [Relax, this is NOT a study in relative simultaneity like
> the
> > > Barn/Pole thing.] As you stand there a huge spacecraft coasts by just
> > > overhead, just beyond your reach. The ship seems motionless to you,
> > > hovering, because it is going eastward at a speed to exactly match the
> > > planet's tangential rotational speed. As you reach up, your outstretched
> > > fingertips are just about touching the 842−meter mark and the 843−meter
> mark
> > > on the rule graduated on the enormous ship's straight exterior.
> > >
> > > Here's the quandary: the spaceship occupants can EMPHATICALLY assert
> that an
> > > all−way light beacon pulse emitted midway between their ship's 842 &
> > > 843−meter marks will hit the two nearby meter marks simultaneously,
> > > according to their native frame's clocks and such. Yet the guy on the
> planet
> > > cannot make the same claim?? When does an arbitrary local span become
> > > tantamount to an SR scenario. In spite of Sagnac, there must surely be
> some
> > > carry−over; I mean you're just about TOUCHING that other frame,
> comoving.
> > >
> > > −Ben

> >
> > *Of course the guy on the planet will agree that the light will hit the two*
> *metre*
> > *marks simultaneously. That is, if he had one clock at each side of*
> *himself,*
> > *and he E−synched those clocks, they would show the same when hit*
> > *by the light.*
> > *However, if the two clocks were showing UTC, they would NOT*
> > *show the same when hit by the light.*
> > *Clocks on the surface of the Earth showing UTC are NOT synchronous*
> > *in the Earth fixed frame. They are synchronous in the non rotating*
> *ECI−frame.*
> >
> > *Paul*
> >
> >
> *Great answer! Uh, but, whereas I know what ECI stands for, I am at a loss as*
> *to what UTC stands for.*

UTC means "Coordinated Universal Time", and to say it simple,
it is the same as local mean time.
See also my response to "sal".

> *But I think it matters not. You say that Earth's*
> *surface clocks can all be synched to the non−rotating ECI, which suffices.*

Yes, and I say that this IS how we synchronize clocks on the Earth.

> *I*
> *don't necessarily buy your dismissal of Sagnac (of course I am*
> *misinterpreting perhaps), but your answer suggests that a light signal takes*
> *the same time to go from NY to LA as the reverse, as long as you use the*
> *non−rotating ECI clocks as your basis.*

UTC clocks on the Earth ARE "rotating" along with the Earth.
I said they are synchronised (simultaneously showing the same)
in the ECI−frame, NOT that they are stationary in the ECI−frame.
And if you measure the time light takes to go from NY to LA with
these UTC clocks, you will find that it is different from the time
it takes to go in the reverse direction.
This IS the "Sagnac effect".

> *I guess that makes sense alright, but*
> *it's insufficient. The guy reaching up and touching the inertially moving*
> *space ship −− he has a wrist watch on each arm and he claims they are*
> *synchronized. His clocks belong to a frame that IS rotating. I'm just not*
> *sure. Again, what is UTC, Universal Time something?*

If this guy claims his writs watches to be synchronized, he will
probably mean that they simultaneously show the same in
his instantly inertial rest frame. (The inertial frame in which he

instantly is at rest.)
And his clocks will stay in synch.
If he measure the speed of light with these clocks, he will find
that it will use the same time in both directions.

But if he compare them to two adjacent UTC clocks, he will
see that they are different, because his watches are NOT
synchronous in the ECI−frame.

> The central question is, "How does light behave in the frame of the man
> standing with his arms outstretched (over his head), and ONLY according to
> that man's native clocks & measures"? Can the man say that a light signal
> emitted midway between his hands arrives at each hand at precisely the same
> time? Probably not.

Yes, he can.
He will use his local frame.

> But light would clearly not move relative to a
> theoretical aether fixed at the planet's center either. So there must be
> some give. Light must take less time to go westward than eastward (on the
> spinning planet), which would be in line with the Sagnac findings, but not
> so much less time as would be predicted by imagining the light travelling
> through some fixed aether frame anchored at the planet's center.
>
> It's confusing alright.

Yes, it IS confusing. :−)
But remember this:
According to SR, the speed of light is c _in an inertial frame_.
As long as you remember this, it is quite obvious that if you
emit light in both directions from some point on the equator,
and guide the light (mirrors) around the Earth, the two light beams
will meat each other at the same point _in the ECI frame_
as they were emitted from. But then the point on the Earth
has moved, so one of the light beams has already passed
this point, while the other one has not yet reached it.
So _because_ the speed of light is c in the ECI−frame,
the two beams will NOT simultaneously reach the point
on the Earth from where they were emitted.
A clock at that point will thus measure the light to use
different times around the Earth in opposite directions.

Paul