Re: Circular motion in SR

Source: http://sci.tech−archive.net/Archive/sci.physics.relativity/2008−03/msg02051.html

* *From*: PD <TheDraperFamily@xxxxxxxxx>
* *Date*: Sun, 23 Mar 2008 10:53:34 −0700 (PDT)

On Mar 22, 10:50 am, rbwinn <rbwi...@xxxxxxxx> wrote:

> On Mar 22, 7:27ýam, PD <TheDraperFam...@xxxxxxxxx> wrote:
>
> > > > But the rotation of the sun is not the
> > > > standard. The standard is
> > > > defined in terms of reproducible physical
> > > > processes that can be
> > > > replicated locally.
> >
> > > Well, The Galilean transformation equations can be
> > > referenced to the
> > > rotation of the sun, but not to reproducible physical processes
> > > replicated locally.
>
> > By choosing some distant reference, one can *always* impose an
> > absolute time, sacrificing all locally consistent behavior. That,
> > however, is not an obviously superior position. It leaves you with the
> > situation that, in terms of rotations of the sun, an observer at rest
> > can measure radioactive half−lives, the growth of trees, the
> > population of bacteria, an AC−circuit resonance period; but as soon as
> > you go to a frame in which the sun is moving, then you need to *first*
> > redefine seconds to be in terms of that distant sun's rotation, and
> > then after doing so you note that all your local radioactive half−
> > lives, the growth of the trees, the population of bacteria, and the AC−
> > circuit resonance period have all changed in terms of the new second.
> > Seems rather stupid, just to preserve the rotation rate of the distant
> > sun and to preserve a Galilean transformation.

> If you make this change just to preserve the Galilean transformation, and as a result you find that all local physical phenomena now have different rates, then this *normally* would be an indication that the Galilean transformation is not a good one to insist on. And in fact, the Galilean transformation was thought to have value when it was believed that you would not *have to* do the goofy redefinition of the second you propose. When it was found out that you'd have to, most reasonable people began to look for a better transformation than the Galilean one. You on the other hand, want to preserve the Galilean transformation, even though it would mean that all local physical processes would now have different rates. Why you think that's better is beyond me.

> I think that local physical processes having different rates is reality,

But there is no evidence for it. Note that all the local physical processes would have to have their local rates affected by *exactly* the same amount, even though they are completely different processes.

> and if they are affected by velocity,

They are NOT affected by velocity. I already tried to address this with you. The differential aging of the twins does NOT have to do with the speed of one of the twins.

> I believe that there
> may be other factors which also affect local physical processes. What I cannot understand is the position of scientists. Scientific time is the only measurement of time allowed. OK, so what about your twin theory? How do they ever get back together according to scientific time?
> If they do, then obviously, there is some measurement of time that includes the separation of the twins and their reuniting, which could be calculated in either frame of reference.

No, sir. There is only frame−dependent time. There is no single time measurement that both both twins would agree on. (You also mention "either frame of reference" as though there were two. There are not two. There are at least three.

> So, as the Galilean
> transformation equations show, there is not a different number of separatings and reunitings in one frame of reference as compared to

the other.

OK

And the twin does not leave and return in one frame of reference and then wait until he finishes returning in the other.

OK

If time is measured by separatings and reunitings in each frame of reference,

But it's not. It's measured according to the number of seconds elapsed, and the number of seconds elapsed is determined by a standard second that is defined in terms of local physical standard, and against which it is verified that all physical processes behave the same in every inertial reference frame. (That is, trees grow in the same way, thorium samples decay in the same way, bacteria multiply at the same rate, hair grays at the same rate, etc.) And by those standards, the interval of time between the separating and reuniting of the twins is *different* between the two twins.

then t'=t, just as the Galilean transformation equations show. The difference in clock rates will not affect how many times the twin leaves and returns. But you would have to decide which clock has the more meaningful time in describing what took place.

No, you don't. You don't have to say, "Well, we have to choose one to be more correct and the other less correct." Likewise, when I tell you that your speed right now is either zero or 850 mph, depending on whether you are looking at a frame tied to the earth or one that isn't rotating with the earth, there is no need to say one is more "right" than the other. Your speed is simply a frame−dependent quantity, as is your kinetic energy, as is your momentum, and is a whole host of other completely useful and completely frame−dependent physical quantities.

ýThat is why the scientific definition of time as transitions of a cesuim isotope molecule cannot be defined by the Galilean transformation equations except by the way I do it.

> If the traveling twin comes back, his heart having beaten only half as many times as his Earth twin's, his hair still brown where the Earth twin's has turned gray, and with the traveling twin's box containing a radioactive isotope with an activity rate twice that of the Earth twin's equivalent box, and the traveling twin's crystal−growing tank exhibiting half the crystal growth of the Earth twin's equivalent tank, it makes no sense to say that the traveling twin and all those processes are nevertheless 40 years older even though by any standard measure they match what would be expected of those process after 20 years.

Well, think of it this way, suppose both twins observe a planet revolving around another star during the trip the one twin makes. ýThe planet revolves around the star the same number of times during the trip as seen from the frame of reference of either twin. ýSo consider it from the perspective of a scientist on the planet being obeserved.
What is more important to him in terms of measurement of time, the number of times the traveling twin's heart beats, The color of his hair, the box containing a radioisotope, the time on the traveling twin's clock, or the number of times his own planet orbited its star.
The Galilean transformation equations agree with the scientist on the planet orbiting the star. ýLocal differences may be interesting, but they do not control the universe the way scientists on this earth maintain they do.

That's why we HAVE standards for time that
are based on locally
reproducible physical processes, so we don't
HAVE to use some
ridiculous and arbitrary standard like the
number of rotations of one
star in one galaxy chosen for no particular
reason.

That is fine, but if you are going to use the Galilean
transformation
equations, there will be a preferred frame of reference.

Agreed. It's just not obvious that the Galilean transformation needs
to be upheld, or that it even really does apply.

Well, I can understand the reluctance of scientists to consider it
after all of the scorn which was heaped on scientists who tried to
hold to Galilean relativity in the early part of the last century, but
those scientists had the disadvantage of never considering anything
except absolute time, so they were doomed to failure. Then there was
also the Nazi thing. Einstein was discredited in Germany, and the
Germans lost two world wars. So why were German scientists in such
high demand after World War II?
They must have been doing something right.

ýGenerally
speaking that seems to be controlled by the gravitation of the
system. ýSo if ground control tells an astronaut, Your
velocity is 30
miles per second, and the astronaut comes back saying, No,
my clock
shows I am going faster than that, then we know which clock
to
believe. ý

It is not a matter of needing to believe one or the other. It is a
frame−dependent quantity and is known to be frame−dependent, and so
there is no need to assign one or the other as being the one to
believe.

Except that there is a definite circumfrence to the orbit of the satellite.

No, that is incorrect. There is a circumference to the orbit of the satellite that depends on whether that circumference is measured from earth or whether it is measured from the satellite. Moreover, the radius of that orbit depends on the reference frame. The radius of the orbit of Mercury as measured by someone on the surface of Mercury will differ from the radius as measured by someone on the surface of the sun by about 2 parts in a billion. For the Moon and the Earth the difference is about 5 parts per trillion.

How does that circumfrence stay the same in a calculation of the velocity of the satellite and the distance the satellite travels?

Or else the altitude of the satellite is different in the frame of reference of the astronaut, or the value of pi changes. ýYou
scientists never did say which you prefer.

ýThe traveling twin would
just
have a clock that registered
less time than the clock of
the one on
earth.

[rest ignored because of expiring attention]

Well, I know how boring reality must seem to scientists. ýIt probably
has a purpose, nonetheless.

Robert B. Winn− Hide quoted text −

− Show quoted text −− Hide quoted text −

− Show quoted text −

.