Re: What happened between Newton and Einstein?

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- *From*: "PD" <TheDraperFamily@xxxxxxxxx>
- *Date*: 1 Mar 2007 12:56:12 −0800

On Mar 1, 1:57 pm, "kk" <mr_kurt_kings...@xxxxxxxxx> wrote:

> On Mar 1, 10:19 am, "PD" <TheDraperFam...@xxxxxxxxx> wrote:
>
> > I'm sorry, I don't see how absolute motion is
> > the *only* possible cause of the age differences
> > between twins and triplets.
>
> > In the case of the twins, A and B, A and B *both
> > agree* that A takes a straighter path through
> > spacetime than B. However, this in no way implies
> > anything about absolute motion.
>
> You don't see it because using twins obscures the
> truth. You must use triplets to clearly see what
> is happening.
>
> Unlike the twin case, the triplet case contains
> no turnarounds and no accelerations.
>
> This leaves only motion through space (aka absolute
> motion) as the physical cause of the triplets'
> age differences.

Perhaps. I take it that you've posted this "triplet paradox" someplace. Perhaps you'd like to give it another go in a separate post. Until then, I really can't comment. You were the one that brought up the twins.

> [kk wrote:]
>
> Re your second claim, I reply that since Einstein's

> 2nd postulate is purely a mere definition (of clock synchronization), it cannot pertain to anything in nature.

> > I completely disagree. The second postulate is an explicit statement about what will be the result of a measurement of the speed of light,

> Please describe how this "measurement" can be made.

Why? A postulate does not need a direct measurement. The *implications* of the postulate are what's tested. Didn't I say that already?

> > There is NOTHING in the statement of the second postulate that says anything about clock synchronization.

> > Please describe how one can measure light's one−way speed between points A and B without using two clocks that have been "synchronized" in some way.

I can synchronize clocks without using light. I simply note the time at clock A, walk all the way to clock B and note the time there, and then walk at the same speed back to clock A and note the time again. If the time difference on clock A is twice the time difference between clock B and clock A readings, then the clocks are synchronized. No light needed. I can do that in the dark.

Why would I have to make that measurement without clocks synchronized at all?

But, if it makes you feel better, here's a way that doesn't require two displaced clocks at all, so that any appearance of circularity is removed: Receive a light signal from a source, any source. Measure the wavelength by an instrument solely and directly sensitive to wavelength −− a diffraction grating will serve. Measure the frequency independently by an instrument solely and directly sensitive to frequency −− a frequency comb will serve. Then multiply the measured wavelength and the measured frequency and the result is a measured speed of light. It is expected that the answer will always be c.

> After you have tried to provide this description and
> failed, it will then dawn on you that the 2nd postulate
> is indeed purely a definition of clock synchronization,
> as Einstein said.

Sorry, still don't follow.

> That is, you will then see that since it is not
> possible to measure light's one−way speed from
> point A to point B without two clocks, and you
> will also see that the clocks must be related
> in some way, you will see that someone must
> provide a prescription for how the clocks are
> to be related, and this is a definition of
> clock synchronization.
>
> However, in Einstein's case, the following problem
> arises:
>
> Einstein cannot really (or absolutely) synchronize
> clocks,

Nor does he claim he's getting an absolute synchronization. He's just using a prescription that works, even though it is purely a synchronization local to that reference frame. There is no workable synchronization procedure that generates an absolute (across all reference frames) synchronization, so we take what we have.

> and even if he could, he would not get the
> "answer" that he wishes to get, namely, a one−way
> "null result."
>
> The only way Einstein could obtain a one−way "null
> result" was by forcing clocks to read x/c when a
> light ray traveled the frame distance x.
>
> But this is clearly not a measurement; it is only
> a stipulated "result," given at the start before
> any measurement is made.
>
> This is why you cannot describe the procedure for
> the "measurement" that you claimed can happen.

Gee, I dunno. Use my synchronization procedure. What's wrong with

that?

> However, the postulate is not dependent on clock
> synchronization in any way. In fact, using light
> for clock synchronization is not even a *requirement*.
> You can synchronize two spatially separated clocks
> by *any* procedure that carries a signal at the same
> speed in both directions −− including walking. Einstein
> just happened to use light because he had just
> postulated that it satisfies this criterion as a usable
> signal.

Here's Einstein's 2nd postulate:

"Any ray of light moves in the 'stationary' system of
coordinates with the determined velocity c, whether
the ray be emitted by a stationary or by a moving body.

Hence

velocity = light path/time interval

where time interval is to be taken in the sense of
the definition in section 1."

Here's the definition from section 1:

"Let a ray of light start at the 'A time' Ta from A
towards B, let it at the 'B time' Tb be reflected at
B in the direction of A, and arrive again at A at
the 'A time' T'a.

In accordance with definition the two clocks synchronize
if
Tb − Ta = T'a − Tb "

No mention of walking or bullets or baseballs; only light.
Also, note Einstein's use of the word "definition."

Note that this definition works for *any* signal that you can
guarantee travels at the same speed from B to A as from A to B.

The fact that Einstein chose light does not mean that it is restricted
to light. Are you reading more into it than what's there?

> The time portion (Einstein's "time interval") of
> the 2nd postulate is dependent upon Einstein's
> definition of clock "synchronization."

I see where you're going, but the circularity is not there.

> Note that Einstein did not experimentally measure
> light's speed during any part of the 2nd postulate.

Nor does he have to. That's why it's a postulate and not a measured fact.

> In fact, no one has ever measured light's speed
> from point A to point B.
>
> Einstein merely stipulated that the clocks must
> read equal travel times. That is, they were
> forced by Einstein to read equal travel times,
> so they did not get this result experimentally.

But if you synched by walking and then measured, then there wouldn't be any connection, would there?

> This means that the 2nd postulate really has
> nothing to do with physics − it is merely a
> definition. It says nothing at all about any
> thing in nature. It merely reflects Einstein's
> belief that we will never be able to detect
> absolute motion. It is a mere artificial
> null result, given entirely by man.
>
> In fact, it is impossible to experimentally
> obtain a null result in the one−way case.
>
> ("one−way case" here means "the direct and
> simple measurement of light's one−way speed
> between two points without using clocks that
> have been transported or rotated because such
> clocks run slow.")

[kk wrote:]

> Real clock slowing and real rod shrinkage entered
> SR not via Einstein's postulates, but via his
> upfront (pre−postulation−era) acceptance of the
> Michelson−Morley experiment null result. (Actually,
> Einstein simply accepted upfront full round−trip
> nullness, which included both the MMx and the KTx,
> with the former having rod contraction, and the
> latter having clock slowing.)

> Actually, if you read the histories of this, Einstein was pretty
> steadfast in being unaware of the MMX result. However, he was *quite*
> aware of the form of Maxwell's equations, and he was *very* aware of
> that factor of c that appeared everywhere in them, and he was
> *painfully* aware that no absolute speed appears anywhere in any of
> the Newtonian laws of motion and that this fact ensures their
> invariance with choice of inertial reference frame. And so he simply
> tried to figure out how it is possible that c could appear in
> Maxwell's equations and still have those equations be invariant with
> choice of inertial reference frame. It was Maxwell's equations that
> demanded the invariance of c, not the MMX.

I have read the history, and here it is:

[From the 1905 relativity paper]
"In agreement with experience we further assume the
quantity 2AB/(t'a−ta) = c to be a universal constant −−
the velocity of light in empty space."

Einstein's "in agreement with experience" means "in
agreement with experiment." And the only experiment
that said "round−trip invariance and isotropy" was
the Michelson−Morley experiment.

Sorry, leading the witness. There was ample experimental evidence for Maxwell's equations. He was not referring to direct measurement of 2AB/(t'a−ta). Sorry. When I said read the history, I meant accounts by Einstein of his thinking *preceding* this paper. In these accounts, he was quite firm in being unaware of the Michelson−Morley experiment. You seem to be trying to convict a dead man of perjury, for what gain I don't know.

> (footnote: actually,
> the MMx said only isotropy; the later KTx added
> invariance; this is why Einstein used the word
> "assume"; he knew that he was talking about both
> isotropy and invariance.)
>
> Maxwell did not measure light's round−trip speed.
> Nothing in Maxwell's equations tell us anything
> about either light's one−way or round−trip speed.

Sure it does. It involves the absolute constant c. It's relatively unheard of for a theory to include a velocity (as opposed to a relative velocity), because to do so makes it depend on inertial frame. That's precisely the point. It says that light's speed will be c. It is assumed (by Einstein) that, like Newton's laws, this law pertains, including the value of c, for any inertial frame looking at the same event. That's what Newton's equations do: even though all the values of the individual velocities change, depending on the frame of reference, the form of Newton's laws (including any general constants) remain completely unchanged. It doesn't matter whether you view the law of gravity from a frame locked to the sun or one traveling at 100,000 mph with respect to the sun; the law governing th motion of the Earth, including the value of the gravitational contant G, does not change one bit. Ensuring that Maxwell's equations exhibit the same behavior is what Einstein was after.

PD

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