Re: So... Lerentz Contractions are *physical* not observered?

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mgconsolidated@xxxxxxxxxxxxxx wrote:

> Can anyone provide / point to a definitive answer on whether Lorentz
> contractions are physical or an observered effect.

This depends on what you mean by those words.

Here's an analogy: a ladder will fit through a doorway if it is oriented correctly, and won't fit if it is oriented differently −− is this difference "physical"? −− after all neither the length of the ladder nor the width of the doorway change in any way. This is an example of GEOMETRICAL PROJECTION −− if the projection of the ladder's length onto the doorway's width is small then it fits, and if that projection is large then it won't; this depends on their relative orientation.

Lorentz "length contraction" is similar: the invariant length of an object is GEOMETRICALLY PROJECTED onto a coordinate system, and depending on orientation the projected value of that length can be less than the invariant length of the object (the invariant length of an object is its length in its own rest frame).

So the object does not get "physically" any shorter (i.e. its invariant length remains constant), but the orientation between object and coordinates used for measurement can have "physical" consequences (i.e. one obtains a different value for the length, the pole can fit into the barn in a famous gedanken, etc.).

Note that "orientation" in this case is in the X−T plane (for motion along X), and varying orientation corresponds to varying relative velocity (between object and coordinate system).

[Plot X vs Y on Cartesian coordinates, and note that
varying orientation corresponds to different slopes of
lines. Plot X vs T similarly, and note that varying
slopes of lines correspond to different velocities.]

> The summary seems to go along the lines of....
>
> Get two trains 100 metres long each heading towards each other on a
> single track
> Put a passing point between them 80 metres long
> At non−reletavistic speeds you simply can't get one train past the

> other − however you try, they crash
> At relatavistic speeds, each train will observe the passing point less
> than 80 metres, but will observe the other train significantly
> shorter, due to its much greater speed (relative to themselves) and
> there will be no crash
>
> The only sniff of a problem I can see with the above is that you can't
> ignore GR in this case, as the original measurements were taken in the
> same frame of reference, and the second measurements taken following
> acceleration.

GR is not needed.

Consider the situation in the inertial frame of the passing point, and it's easy to see that the shorter trains can pass using the 80 meter passing point. If you try to consider what it looks like in either train's frame, you must also include the difference in simultaneity: in train A's frame the passing point is shorter than train A, and the sequence is this to train A: train A's front enters the passing point, train B's front enters, then trains B's rear enters and B is wholly contained in the passing point while train A's rear is still outside, train A's front starts to exit the passing point, and then its rear enters the passing point just before B's front reaches that end of the passing point. So again there is no crash. Similarly for the view from train B.

Tom Roberts
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