Re: A funny kind of rectilinearity

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- *From*: Tom Roberts <tjroberts@xxxxxxxxxx>
- *Date*: Wed, 03 Aug 2005 01:00:59 GMT

msadkins04@xxxxxxxxx wrote:

> Tom Roberts wrote:
>
> > The light always propagates with SPEED c in any inertial
> > frame, but its direction in any frame clearly depends on the orientation
> > of the source in that frame.
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> I hope you're not suggesting that in one frame the laser is pointed
> toward the detector, whereas in another frame the laser is pointing
> toward an empty section of space where the detector will be in future,
> and that the empty section of space the detector points toward is
> different for every such frame.

This depends on what you mean by "point". If you mean something like "the centerline of the laser extended along its length simultaneously", then yes −− the sticky point is that "simultaneously". If you mean the actual direction the beam takes, then no.

> Either the laser is pointing
> toward the detector, in which case it does so in every frame, or else
> the laser is pointed into space (but then we have the absurd conclusion
> that the angle between laser and detector is different for every
> frame).

This does not make sense −− two objects do not determine any sort of "angle". And look above for the ambiguity in your "pointing".

But if the laser beam hits the detector when viewed from one frame, it of course does so when viewed from any other frame. Note my phrasing −− objects are not "in" any frame; frames are used for viewing only (i.e. measuring). Of course objects can be "at rest in" a given frame, but that is quite different from being "in" the frame (which implies exclusivity which is not possible).

> BTW this is true in Newtonian physics for light or any object with finite speed, such as cannonballs -- drive past a cannon firing vertically, and in the frame of your car the cannon is not aimed straight up (where "aimed" is defined by where the cannonball goes, not necessarily the orientation of the cannon itself).

> Yes, but in Newtonian physics velocities are additive and it makes perfect sense that something sharing the scalar component of a velocity vector should share the directional component as well. When the scalar component isn't shared, as in SR, it's rather puzzling that the directional component is shared.

You confuse yourself by attempting to separate "scalar part" from "directional component". The transforms most naturally relate the components of _vectors_ (3-vectors in NM, 4-vectors in SR).

BTW in NM, for an object viewed from frame A and from frame B, the two frames do NOT "share the scalar component" of the object's velocity (except for certain unusual circumstances):

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v . v != (v+u) . (v+u)      for 3-velocities u and v.
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> The relative motion is observed, but the attribution of that motion to
> either of the two frames is an assumption. That is, it is an *assumption* that frame S' is moving (the assumption of S), and it is
> an *assumption* that frame S' is at rest (the assumption of S').

No. You are caught up in old-fashioned words. There is no "at rest", there is only "at rest relative to S" (or S'). There is no "moving", there is only "moving relative to S" (or S').

> Either a frame is moving, or it is not. [...]

That seems to me to be the central part of your error and confusion. There is no "moving", there is only "moving relative to S" (or S').

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