

Re: GR ?

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- *From:* Tom Roberts <tjroberts@xxxxxxxxxxx>
 - *Date:* Thu, 21 Jul 2005 02:02:16 GMT
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Significant Zero wrote:

"Tom Roberts" <tjroberts@xxxxxxxxxxx> wrote in message
[news:10YCe.673\\$1X2.670@xx](mailto:news:10YCe.673$1X2.670@xx)
[...]

This seems to be saying that length contraction and time dilation are just observational distortions in the same way that railway lines get apparently nearer as they extend to the horizon.

Sort of -- both are effects of perspective, but different effects.

Is this the way you explain to yourself the experimental variation in muon decay and contraction in the direction of motion ?

It is the way SR explains them. Just like rotations in 3D -- what "explanation" do you use for the fact that a 10-foot-long ladder will fit through a 3-foot-wide door in one orientation but not in another? I say it is because the PROJECTION of the ladder's length onto the axis of the door's width depends on their relative orientations. Similarly in SR, the PROJECTION of a rod's length, and the PROJECTION of a clock's tick-interval, depend on their orientation relative to the measuring apparatus. This is, of course, orientation in spacetime.

On a Euclidean plane, the x' axis of Cartesian coordinates rotated relative to x-y coordinates has a nonzero dy/dx. In 2-d spacetime the x' axis of Minkowskian coordinates rotated relative to x-t coordinates has nonzero dx/dt -- that is clearly a relative velocity. The rotation is of course hyperbolic, not circular as in the Euclidean case.

| > i.e A cubic meter of the vacuum state between galaxies
| > has different characteristics to a cubic meter just outside an event
| > horizon[...]

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This may be difficult to explain but perhaps you will agree that a clock in the in the two vacuum cases above will tick at different rates,

No, I don't agree to that highly-ambiguous statement. Before you can say anything about this you have to define how the rates of the two clocks are compared. Once you realize that, you will realize that you cannot possibly separate "difference in tick rate" from "effects on the signals used to compare them".

In GR this is modeled as geometry in spacetime. To do that the intrinsic rate of a clock cannot depend on its environment. For instance if you define "comparison of tick rates" by placing a standard clock next to each clock to be compared and then comparing those clocks to the standard clocks, you will immediately see that their tick rates are the same.

so time
according to the clocks is moving at a different rate ?

The word "moving" does not apply to "time".

A simple way to avoid such nonsense is to remember that in physics anything worth discussing must be MEASURABLE. How could one possibly measure "motion of time"???

If so then if c is
measured locally constant in these two environments but the clocks are
running at different rates then actual length must have changed to
accommodate the actual but locally unobservable change in c ?

See above. You confuse yourself by attempting to use incomplete sound bites to describe things instead of complete and detailed descriptions.

Most people, especially around here, do not realize how important precision in thought and word is. Modern physics is quite subtle, and precision is ABSOLUTELY ESSENTIAL. My insistence on such precision is not "nit picking", but is ESSENTIAL to understanding the concepts.

| Certainly the Lagrangian of a system does not, in general, by itself
| define energy. But if it is invariant over time translations then it
| does (via Noether's theorem). And if it is not so invariant, energy is
| not so useful....

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That makes no sense to me as energy is a dynamic and the only relatively static and invariant over time, form of energy that I can think of at the moment is a partical. Which implies that Lagrangian are not applicable to energy of fields.

You clearly do not understand Lagrangians. Study them. Don't merely fling words around without understanding.

| The metric IS the geometry.

I tend to think as the metric as being [...]

You clearly do not understand differential geometry. Study it. Don't merely fling words around without understanding.

| And in general it is not possible to
| "refer" a curved Lorentzian manifold to a "flat Euclidean geometry".

I don't see the difficulty in overlaying one metric space with another and translating between them other than the complexity.

You clearly do not understand differential geometry. Study it. Don't merely fling words around without understanding.

Specifically: the topology of a curved manifold can be, and usually is, incompatible with the topology of a flat Euclidean manifold. So such "referral" or "translating" is simply not possible.

Why do you think that it is impossible to cover the surface of a sphere with a single coordinate system? That is directly related to the impossibility I discuss here.

In fact curvature is a
Euclidean statement [...]

Not true. You clearly do not understand differential geometry. Study it.

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Don't merely fling words around without understanding.

Tom Roberts tjroberts@xxxxxxxxxxx

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