Title: Spacetime in special relativity

October 24, 2024

Author: Roger Luebeck

Submit comments to: luebeck.roger@rogcad.com

Spacetime in special relativity

Spacetime is a mathematical model -- a construct -- wherein time (t) is combined with space (x, y, z). It comes up short of being a physical reality.

We have freedom of movement in space, but we do not have freedom of movement in time. "t" has a completely different status from that of "x, y, z". Small wonder that spacetime adherents fail to resolve -- by way of employing a spacetime diagram -- a paradox of their own making. It is time-keeping (i.e., clocks, whether of a chemical, biological, mechanical or electromagnetic nature), not time in the sense of the march of history, that changes.

Time-keeping is strictly dependent on the absolute speed of light. It is that simple, as we diagram in the article linked to at the bottom of this document.

Spacetime is a useful calculation tool, yet it is a construct, entirely dependent for its existence on Einstein's utilitarian and limited approach to clock synchronization -- a clock synchronization which is not even required for deducing the results of special relativity, and which vacates, or neutralizes, an absolute frame of reference -- the universe itself.

Spacetime generates a false jump in the reading of time passage:

The best one can do with a spacetime argument in the context of the twins paradox (which involves a change in inertial motion) is to note that a traveler, upon his turn-around, will observe a jump in the reading of the clock time of the stay-at-home using the "lattice of clocks" method dictated by the dismissal of the underlying reality of space (or the universe) itself:

It is precisely one's motion with respect to the universe -- and to the same end, one's speed as a percentage of the actual speed of light -- that dictates that party's actual clock rate, resulting in the actual time-keeping differential which is seen upon reuniting with the other party.

Any attempt to explain an actual time-keeping differential while forbidding "the actual" is doomed to fail in a purely logical sense; in a purely mathematical sense.

Einstein's clock synchronization method (tB - tA = t'A - tB) correctly dictates an equal time-keeping value for the translation of a pulse of light, whereby spatially separated clocks of the same inertial frame record equal time passage for a pulse of light moving in either direction through the particular frame. But by specifying that equation without context (he doesn't consider the particular frame's speed relative to actual light speed), Einstein disregards the physical nature of those clocks and the actual constancy of the speed of light. [1]

Thus, in Einstein's treatment, that equation ignores "the actual" – the physical reference frame of the universe. In so doing, the time-keeping of every clock, regardless of its actual inertial frame, is unfortunately elevated to a reality of time passage, with each clock's reality given equal status.

That works well until there is a change of inertial frame, at which point Einstein has no explanation for the “peculiar” disparity in time-keeping between reunited clocks. His clock synchronization, without consideration of the underlying reality which dictates it, leads directly to the "lattice of clocks" methodology which is in lock step with spacetime diagrams. It has the "jump in time" built in for any situation involving a change of inertial frame.

It is in a spacetime diagram that we find the infamous sudden shift of a line of "simultaneity" (simultaneity *as perceived*). The further away (or the higher the overall speed) the inbound and outbound astronauts are from the stay-at-home when the "sudden turn-around" occurs, the greater the magnitude of the "jump in time" as dictated by the "lattice of clocks" specific to the newly adopted inertial frame. It is the so-called "misperception" explanation of spacetime diagrams.

It is nonsense.

Again: time-keeping is strictly dependent on the absolute speed of light. It is that simple, as we diagram in the article linked to below.

1. Einstein did, ultimately, forcefully argue for the pertinence of the structure of space in special relativity in order for there to be standards for distance, clocks and rods. It was the subject of his lecture at Leyden, fifteen years after producing his special theory of relativity. His initial treatment, in 1905, was absent of any consideration of space as the backdrop for motion; and that initial treatment is the one still wrongly embraced by the physics community at large.

See: Symmetry of measure in special relativity