Momentum Energy Excitation Causes Time Dilation

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2023-04-29.09:54 EDT Sat
https://youtu.be/an6JiBLQqXY&lc=Ugxr1x-b4nZrceqMqIZ4AaABAg

A Comment on the Dialect YouTube post:
The REAL Reason You Don't Understand Relativity (Apr 29, 2023)
https://youtu.be/an6JiBLQqXY?t=14m37s

14:37 *"You don't understand [special relativity] because the people teaching … you don't understand it… [13:12] We need to re-examine … in particular, the assumption of absolute acceleration. [15:17] So hold on to your socks because our channel is about to move into uncharted territory."* Excellent research, but you've reached a conclusion that is non-physical since non-gravitational acceleration *always* requires energy. Energy consumption is an observable — a historical result that, once done, becomes irreversible in both classical and quantum physics. Moreover, it requires energy proportional to the acceleration imparted. Thus, if you look at energy, non-gravitational acceleration is necessarily "absolute" regarding the observable energy consumption.

The deeper problem is too much focus, then and now, on the non-physical concept of *unbalanced* accelerations. Those don't exist. In experimental physics, you *always* see good ol' Newtonian action-reaction pairs in which every action (acceleration) has an equal and opposite reaction (acceleration in the opposite direction). The momentum magnitudes imparted to the two units are identical, though the allocation of *energy* to the two units can vary enormously due to the difference in the mass ratio of the pair.

Now, watch this part closely: Would you agree that the successful insertion of some specific amount of energy into a cohesive lump of matter is an "absolute" event in terms of being historical and irreversible in both classical (e.g., batteries) and quantum (e.g., atomic excitation) physics? Yes? The next question is this: Is the lump of matter *required* to stay spatially localized for its excitation to remain absolute and historical?

Of course not. The battery may remain compact in space, but it may also explode. The atom may stay compact for a while but eventually re-radiates the energy or possibly ionizes. Thus energy insertion is an absolute event *regardless* of whether the unit stays compact. Notice that disruption includes the case of the unit breaking into precisely *two* components, moving in opposite directions — that is, action-reaction pairs.

The point is that action-reaction events — which is to say, *paired* accelerations — are energy-consuming events within the non-energized frame that launches them. If one pair member is vastly more massive, such as earth versus a rocket, it's easy (but also not entirely correct) to *approximate* the launch as a one-sided acceleration. The earth accelerates slightly in the opposite direction, acquiring the same momentum as the rocket. However, the *energy* absorbed by the earth in such an asymmetric-masses event can, in most cases, be utterly ignored for calculation purposes. But it remains real for both sides since you cannot impart momentum without inserting some energy.

Okay, non-gravitational acceleration as *paired* events is always absolute and historical. So what? What does all of this mean in terms of time dilation?

Just this: From the moment of energy insertion into an action-reaction pair, the launch frame always sees clocks in accelerated pairs as moving slower. Notably, there's nothing relative about this. The launch frame can measure those clocks anytime it wants to, at any point along their paths. When it does, it *always* sees a total elapsed time identical to the moving clocks ticking slower.

That's why particle accelerators work! A particle accelerator is an excellent approximation of a launch frame since it acquires almost no momentum energy from launching the particles. The particles, however, absorb enormous amounts of energy per particle compared to their rest masses. As long as they retain that energy relative to the frame that launched them, *their clocks run slower than those of their launch frame.* There is nothing relative about how their clocks slow down since that slowdown is *continuously* measurable as they travel. All "relativity" of time is lost because the launch frame *never* acquired the energy needed to slow down its clocks.

The point is this: Energy acquisition is an absolute and historical event. When that acquisition takes the form of linear momentum, it *constantly and continuously* slows down moving clocks relative to launch matter that received no such energy.

The correct resolution to time dilation is almost absurdly simple: Follow the energy.

A final observation: Yes, the Lorentz equation works, but it's also a bit of a historical disaster that has impeded a more straightforward understanding of phenomena such as time dilation for over a century. The Lorentz or gamma factor, γ, is a computationally messy average of two more important numbers: the forward light path ratio R and its inverse 1/R [1]. The Ratio is identical to *e* to the power of the particle physics quantity known as rapidity, but it's a lot easier to think of it as the ratio (to the rest-frame case) of how much farther light must travel to reach the front end of a moving object. This ratio increases as the velocity of the object velocity increases since the light must travel farther to "catch up" with the front of an object that is moving close to lightspeed.

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[1] T. Bollinger, *Formulas and Google Equations for Converting SR Velocity Factors,* Apabistia Notes 2023-02-08.2230 (2023). https://sarxiv.org/apa.2023-02-08.2230.pdf