S. Durand

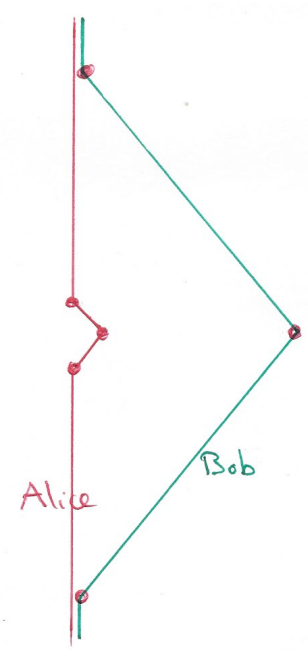
Sabine Hossenfelder - Twin Paradox

Dear Sabine,

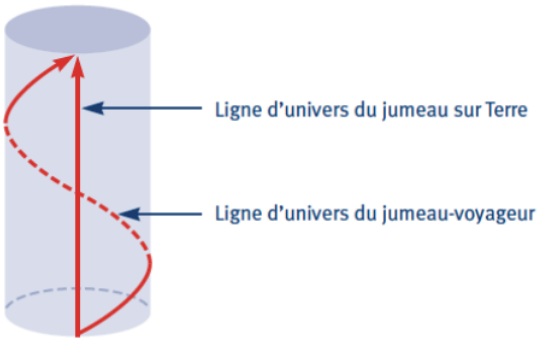
Here are 3 counter-arguments regarding your video about Special relativity and time dilation: https://www.youtube.com/watch?v=ZdrZf4lQTSg
If you have already addressed these points somewhere, I would be very curious to learn about it.

Simple acceleration cannot be the complete answer

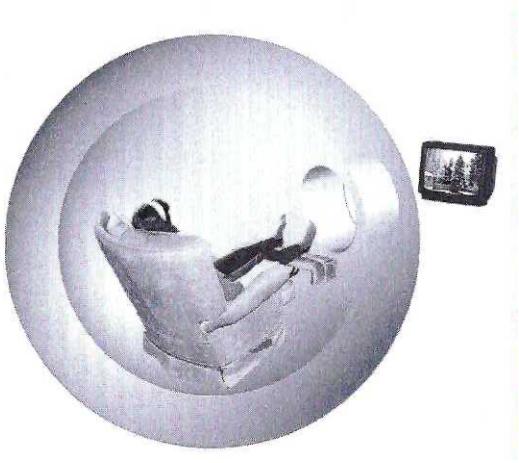
1. Let's imagine that the Earth (with Alice) also undergoes acceleration during Bob's journey. As shown in the figure below, Alice and Bob experience **exactly** the same 3 accelerations and decelerations, yet Bob returns much younger than Alice. So why not simply say that the longer worldline is (from a Euclidean point of view), the shorter the proper time.



2. We can even imagine a situation even more contrary to your explanation with a cylindrical universe. Bob goes around the universe without undergoing acceleration, but still comes back younger than Alice because his world line is longer.



3. Regarding gravity, here is an example where Bob floats in "free fall" (thus without acceleration) in the center of an ultra-massive hollow spherical shell, but his time is still slowed down compared to that of a distant observer. (Gravity is zero at the center, but not the gravitational potential.)



Thank you in advance for your reply,

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