Sonova Quark

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The Enlightened Elevator

Not sure if I will get any takers from last month's cosmic elevator challenge, but here's a recap. **Fig 1** shows a constantly accelerating space elevator with no windows to see outside of. A beam of light is fired from a location above the floor. The beam of light is calibrated to hit the opposite wall at precisely the same height. At what height will the beam of light hit the opposite wall?

1. Above the or original height
2. Precisely at the original height
3. Below the original height

I shall attempt to demonstrate through the use of simple geometry a phenomenon that resulted in proving one of Einstein's most controversial predictions.

Fig 1 reveals what a stationary observer outside of the elevator would see if he were to track a cosmic elevator zipping by at a fast clip. In the horizontal direction (the "x" axis) our observer discovers the elevator is maintaining a constant speed. In the vertical direction (the "y" axis) he detects that the movement is constantly accelerating upwards. Charting the path the elevator follows a simple algebraic function:

$Y = X^2$

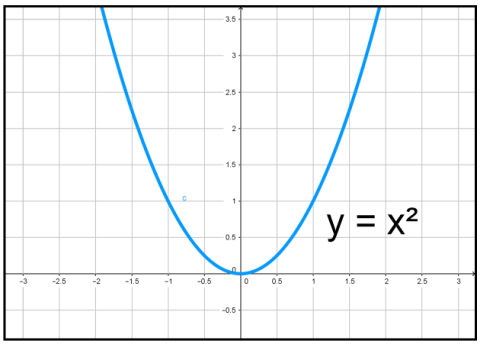

Fig 2

A stationary observer would trace out the path of a parabolic curve. This is basic high school algebra. Acceleration which is measured as velocity that is changing is the equivalent of feeling yourself pressed to the back of your car seat with

What a stationary observer outside of the elevator observes

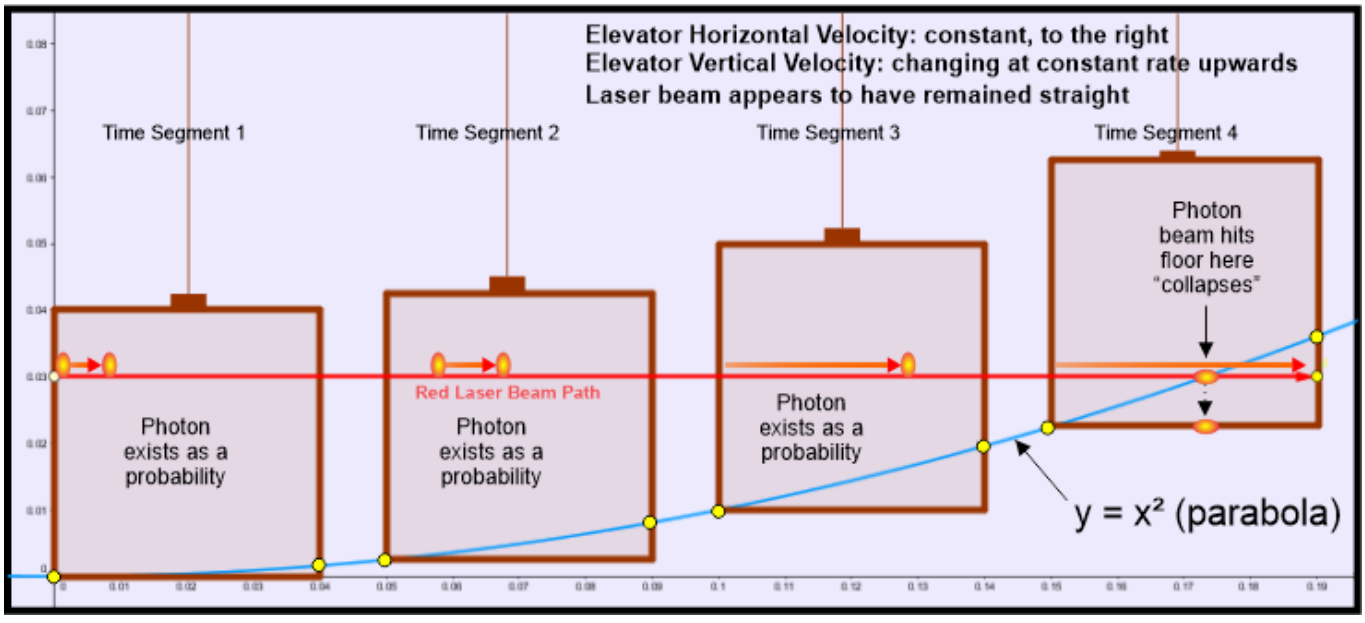

Fig 1

What the kitty observes inside the accelerating upwards elevator

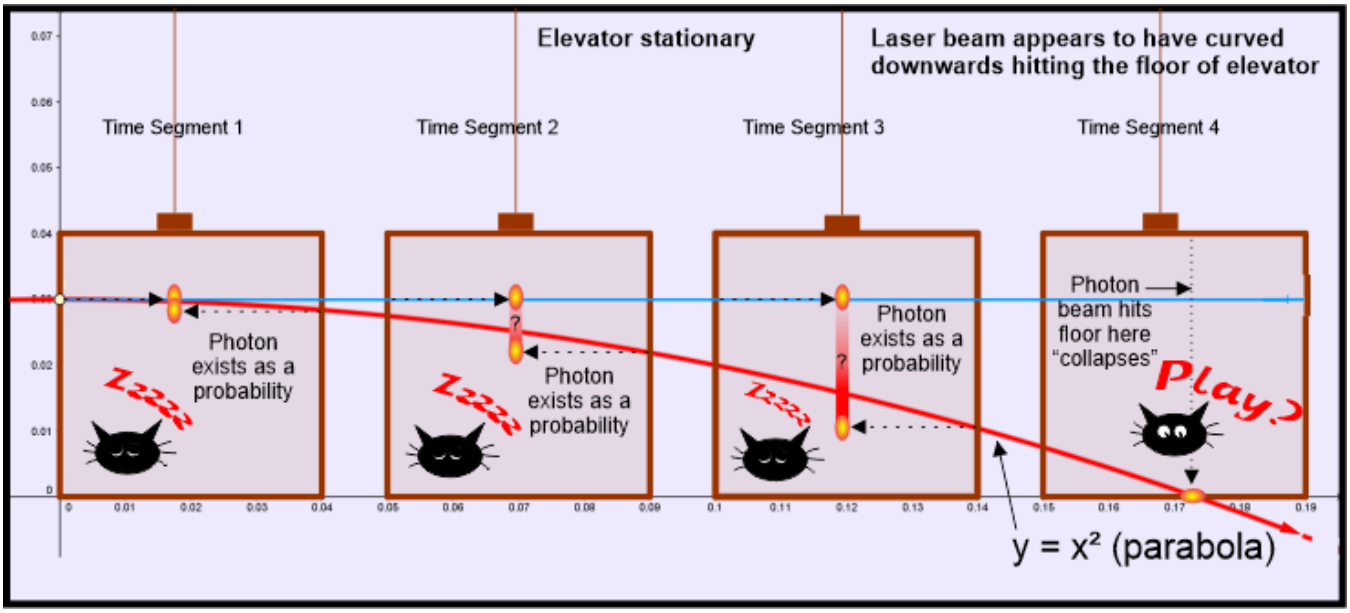

Fig 3

your foot pressed hard down on the accelerator while watching the car's speedometer increase from 0 to 10 mph, to 20 mph, to 30 mph, and beyond in equal time segments. It's the same sensation as experiencing gravity. See Fig 3. The effects of acceleration/gravity are what the kitty feels snoozing on the elevator floor. I think the kitty wakes up when the laser beam photon suddenly "collapses" as a bright red circle on the floor.

Most TURBO readers already know the basic details of this famous light-curving experiment. To refresh our memories: A solar eclipse on May 29, 1921 proved that Einstein's light curving predictions were accurate. The location of a targeted star appeared displaced because the star's light was being bent round the Sun's edge aided by the Sun's massive gravity field.

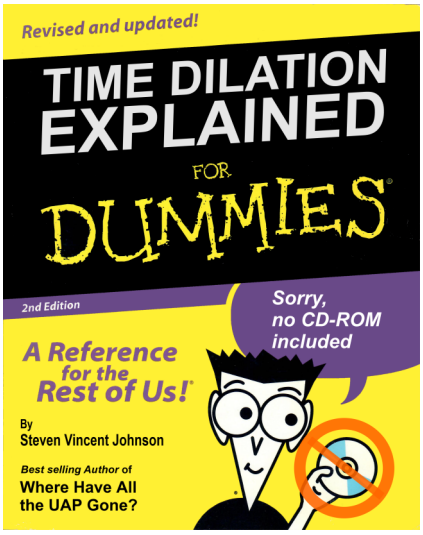

Fig 4

OTOH, what if the elevator had been moving upwards, but at a constant velocity, meaning it wasn't accelerating. Well... the kitty might still be sleeping, but most likely floating about somewhere within the confines of the elevator, perhaps dreaming of retching up a hairball because his stomach feels queasy. Remember, velocity has to be changing in order to generate the effects of acceleration, or gravity. The odd fact is that the laser beam, initially possessed with the same upward but constant velocity, would reach the opposite wall at the same height due to the effects of time-dilation, which, in turn, is due to the effects of relativity. To observe a detailed geometry of this phenomenon see my TURBO article from #324, October 2021, *TIME DILATION EXPLAINED FOR DUMMIES. See* Fig 4.

Now, getting back to our accelerating elevator, the effects of relativity would be affecting the elevator as well, but not enough to counteract the effects of acceleration experienced by the elevator and it's furry inhabitant. So, the photon beam would still bend downwards towards the floor.

While interesting, that's not the real point I'm trying to illuminate. I'm more interested in revealing is the fact that the accelerating elevator experiment, itself, would have proved Einstein's light bending prediction would work. The elevator, constantly accelerating, is being influenced by the same manifestation of physics known as *gravity*. I keep stressing this over and over. Gravity and acceleration are indistin-

guishable from each other. According to Einstein, they *are* the same phenomenon.

I suspect this curious claim remains a very hard concept for most of us bipedal simians to reconcile inside our flat-lander heads. We associate (well, I certainly associate) the effects of acceleration as always being accompanied with movement that we can obviously observe and calibrate. OTOH, gravity does not seem to exhibit the phenomenon of movement. As we stand on the surface of our planet, feeling the steady effects of "acceleration" pressing our feet to the ground, we remain assured that the ground we're standing on isn't actually accelerating upwards, closer and closer towards the moon, to eventually collide with it. We also remain equally assured that all the other celestial bodies in the universe aren't contemplating the same expansive actions either.

Me, being a bi-pedal organism, the no-movement illusion that gravity seems to manifest has continued to flummox me to no end. Most explanations seem reduced to using turgid words and phrases like *"Gravitational gradients by tensor analysis with application to spherical coordinates"* [I think mostly] to scare away other bipeds who might dare ask: WTF!

My conundrum is that I can't let this conundrum go, so WTF! While I have absolutely no proof to make the following prediction, perhaps a prudent use of geometry applied in possibly an out-of-the-box manner might make a difference. But until then...

Whose turn is it to clean up kitty barf?

Replies:

Steve S. #433: You have been very kind in your words of encouragement. Thank you.

The amount of openness and sharing in TURBO, at times, has been remarkably frank in its depth, detail, and intimacy. It's been my experience that what I might feel comfortable or brave enough to share in TURBO often vacillates from month to month. For me, "Do I write, or not write… that is the question", often comes down to how vulnerable I fear I will feel about opening up to the judgement of others without realizing how much self judgement has already gone into the make up of my final decision. Share what you feel comfortable sharing. I'm listening. And so are others.

Your recent email communication concerning your education on the subject of banana slugs shows me you have not lost an envious gift of communicating tastefully cultivated lowbrow humor. It reminds me of an elongated and calibrated Q-Tip taped just outside the entrance of your Computer Science office door. I have fond memories of leisurely luncheons we shared on State Street when I was still working at DoIT, and you at Comp Sci. And that's all I'm goina say about that subject!

Andy #433: I don't' think I have ever equated my on-going interest in paranormal experiences with my current bouts with PTSD-Anxiety. While I may be in danger of misinterpreting your observations, it has nevertheless given me food for thought. What similarities I can perceive between these two subjects does seem to come down to whether I'm willing to trust what I have speculated I once experienced as being the progenitive sources of my current anxieties and/or interpretations. This is a subject that's worth an entire article. I might address it in next month's TURBO edition. Thanks for giving me something unexpected to ponder.

ME: I know you have had felt regrets about turning 70 back on August 18. You keep wondering which shoreline of the big river you are closer to. Do you remember watching your big brother slip five bucks into your refrigerated father's pant pocket at his wake? Keep a ten dollar note in your pant pocket. The rates have gone up.

Pat #433: Back In the 80s I worked in the Sterling Hall UW building at SAL, Space Astronomy Lab, 6th floor. Fifteen years earlier a group of Vietnam protestors bombed the building with intent to destroy the Army Mathematics Research Center located on floors 2-4. While the bombers had assumed the building would be vacant, a researcher working overnight was killed. Around 1 AM, after some heavy drinking on state street, myself, Kim Nash, and another friend drove past Stirling Hall on our way home via an alley road that used to pass by the building's backend loading dock. Had we a clue, we could have seen the pregnant Ford Econoline van as we passed by. The blast pretty much woke everyone up within the entire city of Madison, except me.

Underhastacover