UFO Book—Time Traveler Website Stuff 11/14/24

Crafting a time machine in which a researcher can travel back in the past is a rather tall order. However, if the goal is simply to do historical or paleontological research by observing the past, without any need to arrive in the past in person, there is a different method that could accomplish this. Although this method would be fantastically difficult and expensive, it is *definitely* consistent with all laws of physics, unlike the very iffy backward-traveling time machine. To observe what was happening at a given location and time, say Earth 2,000 years ago, a massive, backward-facing mirror could retroactively be placed 1,000 light years away from our planet. This mirror would have to be several light years in diameter and perfectly-shaped. Then, an absurdly large space telescope near Earth could be pointed at the mirror to observe what was happening 2,000 years ago in any specific neighborhood of our planet. Obviously, this non-interactive method of time travel wouldn't explain UFOs. It wouldn't allow our descendants to travel in person back to the past to actively conduct research, or to escape an unpleasant present by revising events in the past to forge a better timeline. Any alteration of the past, even merely the selection of a new timeline, will require a *true* backward-traveling time machine.

Based on what is currently known about physics, the "nuts and bolts" of such a machine may be as follows:

It's reasonably likely that once a provable theory of quantum gravity is formulated, backward time travel will not be permitted. At present, however, the theory of general relativity *seems* to allow backward time travel. One way to travel backward in time, according to general relativity, utilizes what is called frame dragging, also known as the Lense-Thirring effect.[1] Any rotating object with mass, especially an extremely massive and dense object like a black hole, will drag the spacetime near its surface along with its rotation. If the rotation of a sufficiently massive object is fast enough, and a spaceship is rapidly circling the mass in the same direction that the mass is spinning, the spaceship and its occupants may go backward in time. That is, if the spaceship begins rapidly circling the rotating mass at a certain time, and then later (by reckoning of the occupants) exits the vicinity of the mass, the time outside may actually be *earlier*. Of course, we'd have to ignore these facts: 1) in any reasonably achievable implementation of this time machine, the gravitational tidal forces would be strong enough to rip the electrons from the passengers' atoms, and 2) the amount of backward time travel is different for different parts of the ship, unless the ship is a tiny, narrow one-proton-wide structure.

The original form of this rotating-mass time machine, called a Tipler cylinder, is an extremely massive solid tube, or cylinder, containing something like the mass of one Earth for every inch of length.[2] The cylinder would also have to be infinitely long in order to generate closed time-like loops. However, if negative mass can exist, the cylinder could be of finite length, with rotating normal mass in the center, and rotating negative mass at the ends. However, this would require a hypothetical form of matter or condensed energy which would gravitationally *repel* normal matter. A hollowed out cylinder, in the form of a spinning hollow ring of regular mass, perhaps 10 times the mass of the sun, while only a few miles in diameter, could also be employed as a similarly-styled time machine. Two rings, each with half as much negative mass, would also be stacked on either side of the positive mass ring, and these negative-

---

[1] Herbert Pfister, "On the History of the So-called Lense-Thirring Effect," *General Relativity and Gravitation* 39 (2007): 11-15, https://philsci-archive.pitt.edu/2681/1/lense.pdf

[2] Frank J. Tipler, "Rotating Cylinders and the Possibility of Global Causality Violation," *Physical Review D* 9, no. 8 (1974): 2203.

mass rings would also be rotating. As in *Stargate* film and spin-off TV series, the chrononaut's spaceship could travel in loops inside this three-ring circus—a *spinning ring time machine,* which would be stable and could sit out in space for billions of years, because it is smooth and thus not radiating gravitational waves as it spins.

By itself, this time machine would have zero total mass, with the negative mass canceling out the regular mass. When a spaceship enters the machine, the total mass of the time machine + spaceship system is just the mass of the spaceship. To travel back in time, the rapidly rotating ring would drag spacetime in the same direction as the center ring is rotating. Keep in mind that the rotating negative mass outer rings add to the frame dragging, while making it much easier to escape once the desired time is reached. The spaceship would then perform loops inside the ring, such that the spaceship's speed apparently exceeds the speed of light—made possible via the boost provided by the frame dragging. One caveat is that, although the total mass of the three-ring system is zero, enormously strong gravitational tidal forces would be experienced. This would likely make this journey quite hazardous for anything bigger than an atom, but let's continue with this hypothetical circus anyway.

Similar to a wormhole, this time machine was created at a certain time in a certain location. A traveler can enter it at any later time, and depart from it at any time *before* the entry time (at least as far back as when the machine was created, but note also that the spaceship would need to achieve very high speeds relative to the dragged frame in order to go *backward* in time). For instance, if this time machine was built in the year 1000 CE—not by us, of course—an explorer in 3000 CE with a cutting-edge spaceship could use it to go back to the year 1000. Since the time machine was built and first started spinning in the year 1000, and will likely still exist and be spinning in the year 3000, this trip should be feasible.

When created in the year 1000, the time machine had zero total mass, which it will also have in the year 3000, just before the spaceship enters it. This leads us to a final pair of difficulties concerning the superposition of states and the conservation of mass/energy. In the year 3000, the ship enters the machine, bound for 1000 CE. Even if the contents of the time machine are hidden, and no one could tell by looking at the machine whether there's a spaceship inside, the total mass inside *can* be determined because the mass of the spaceship creates detectable gravity. The question is: What is the mass of the machine in 1000 CE just before the spaceship exits the machine? Is it zero total mass (sum of the negative and positive masses), or is it the mass of the spaceship?

Quantum mechanical uncertainty allows for the machine to be in a superposition of states, that is, more than one state at once. However, those two states have to be very similar in certain ways. The total mass of the two states can't be markedly different; at most, they might briefly differ by the mass of a few atoms. The two possibilities for the mass certainly can't differ by the mass of a spaceship, so there's a logical contradiction here. In fact, the very appearance of the extra mass of the spaceship would also violate local conservation of mass/energy. Exactly at the moment the time machine was created, it cannot simultaneously have two distinct values of total mass.

Arguably, the explorer could initially remove a quantity of mass from the machine equal to the mass of the spaceship before getting into the machine in the year 3000. Then, the machine would retain its initial mass back in the year 1000. In this scenario, the builders of the machine would start it spinning in 1000 CE, with the machine having zero net mass. Suddenly, the spaceship from 3000 would emerge, making the total mass of the machine *sans* spaceship become the negative of the mass of the spaceship itself. Yet while this is mathematically sound, there is apparently no rule saying that the explorer in the year 3000 *must* remove exactly the mass of the spaceship from the machine before entering the machine. In the end, the explorer would be at liberty to violate logic by *not* removing this exact amount of mass.

Several theoretical models have been proposed regarding the use of what are called "wormholes" to travel back in time, but similar logic problems are created in these scenarios.[3] The past-time exit portal through which the chrononaut would leave the wormhole would also be a stand-alone object, and would not have a visible umbilical or "tunnel" connected to it, as is imagined in many science fiction stories. If reverse time travel via wormholes is possible, the exit portal would have a definable total mass and would exist at an exact date and time, and *only* that date and time. This portal must be stable for a short time—at least enough time for the occupant(s) to emerge. Just before the occupants emerge, the total mass of the exit portal could be simultaneously multiple values, in violation of logic. It must be noted that just before a time machine is activated, the universe was in a certain state, and that state does not change as a result of time travelers arriving from the future, no matter how many times they use the time machine. Time travelers can only cause changes in the timeline starting from the moment they arrive, but not before. Therefore, just before arrival, the portal cannot simultaneously have different masses. [Robert: This is intriguing and could be expanded on for a few more sentences. Perhaps a short digression about why we should take these logical violations seriously would also be helpful to readers - and to what extent these are model-dependent and such seemingly insoluble problems might be overcome in later theories.]

---

[3] Michael S. Morris and Kip S. Thorne, "Wormholes in Spacetime and Their Use for Interstellar Travel: A Tool for Teaching General Relativity," *American Journal of Physics* 56, no. 5 (1988): 395-412, http://cosmo.fis.fc.ul.pt/users/crawford/papers/Wormholes%20in%20spacetime%20and%20their%20use%20for%20interstellar%20travel.pdf

The *bootstrap paradox*, in which backward time travel can create objects that were never created, is another side effect of this logical problem concerning mass. A good example of this paradox can be seen in the film *Somewhere in Time* (1980), when a mysterious old woman in the present gives a pocket watch to a young playwright, asking him to "come back." The playwright then time travels back to when the woman was young and gives her the watch before returning to his present time. Meanwhile, she ages up to his present time and gives the watch to him—a watch neither she nor the playwright had ever purchased or externally acquired. Where did the watch originally come from? Backward time travel thus raises the troubling prospect that objects could be deposited in the past, recovered in the present, and redeposited to create more and more mass in the universe. [Robert's suggested revision to below]

If matter can be produced from nothing in this way, time travelers could take something heavy back with them and deposit it in the past, recover it later, and repeat this exercise to create more and more mass in the universe. (Perhaps that would be a good way to keep lots of matter in some location even after all the mass and energy in the distant future universe has either disappeared or thinned out so much that there will be only a vacuum everywhere.)

For backward time travel to be possible, some way of properly dealing with this mass (or mass/energy) paradox must be implemented, yet there are equally sticky *information* paradoxes that also need to be addressed. For instance, if a cure for all cancers is invented sometime in the future, then the information about how to make the cure could be sent into the past (assuming that this action doesn't produce a paradox concerning mass). Yet if the cure were then implemented in the past there would be no need to discover it. So, in this scenario, where did the cancer cure come from?

As we've seen, time travel presents a daunting list of seemingly intractable problems.

[Lisa: I do understand that you're endeavoring to acct for all possibilities of causes of UFOs, but I fear readers will feel like we've strayed far away from the objective for THEM - which is where UFOs are coming from. I suspect many won't want to read much of this VERY complex (for the avg layperson) scientific exposition about how time travel might work, or what the physics are behind parallel universes, and so on.

You may not wish to do this, and I know it would cut out some of the 'meat' of P2, but my opinion is that you could cut down wd count (which would be a good thing, given attn spans today) by condensing a lot of this scientific language and using analogies taken from everyday life, if such exist. I can envision readers enjoying the first half but then becoming quite frustrated with P2 bc it demands so much from them intellectually, and if they're not scientific-minded but do want some answers about UFOs, they may just find another book...

I could, obviously, be wrong, but I know if I picked up this book out of curiosity, I would likely end up skipping over much of this, bc I can't wrap my brain around it (in spite of being more left-brained than right!).]