2 Things Science Hates for Good Reasons and More
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Science is not an individual “thing” or person but if it was, and if it was capable of emotion, most certainly it would ***loathe*** two things for *many* good reasons:
1. backward time travel
2. antigravity

1 would violate ***causality***, which can be summarized by:
a. there are events, before and after a specific time, t_1
b. *no event* ***after*** t_1 *can cause an event* ***before*** t_1
c. in order for an event to ***cause*** another, they ***must*** *be physically* or *logically* ***coupled***

Let’s say you’re an executioner who when you push the button, a guillotine blade slices off a criminal’s head. But it’s not as simple as that, let’s say the signal to “go ahead”, no pun intended, comes to you via quantum communications from a distant star system, so there is essentially no delay in that signal even though separated by vast distance. Your supervisor happens to live on the surface of a neutron star where time passes around twice as slow for him as it does for you. It takes about five seconds for you to verify the criminal’s identity and another five, in your automated prison system, to have the guillotine blade positioned behind the neck of the criminal for execution. Your supervisor knows about the time dilation for his office relative to yours and about the time delay for carrying out executions. He knows that once he signals you for an execution, it takes about 20 seconds of *his time* for you to be ready to perform that particular execution. So, for safety reasons, he adds another 20 seconds of his time, which equates to 10 of yours, before he issues the “go ahead [and behead]” signal. So, the least amount of time you need to perform an *authorized* execution is 20 seconds. He’s monitoring everything on video, which of course looks twice as slow to him, again for safety. Your latest execution assignment is THX1138, for criminal drug evasion, but by mistake, because you spent all night partying with LUH, you sent the execution blade to SAM1109.

Your supervisor notices this mistake and issues a “NO GO!” directive immediately, in his time frame, for you to stop your execution procedure. Bleary eyed and hung-over, you misread “NO GO!” as “go ahead” ***AND*** *you forget* that normally you don’t get that message until *10 seconds later* .. Dear reader, *knowing* we live in a *causal* universe, is there *any* chance you will *not* push that button?

2 would violate ***conservation****, which can be summarized by:
a. ***no*** *mass* can move ***up*** a gravitational potential ***without*** *force application* in that direction
*conservation of momentum, $\mathbf{p}=m\mathbf{v}$ where **p** and **v** are vectors pointing in the same direction, differing only by magnitude m, mass; $\mathbf{F}=m\mathbf{a}$ is similar but about force and acceleration; since x’=v and x’’=a, $\Delta x=|\mathbf{v}|$ *which* ***requires*** a corresponding **a** and **F** in **v**-s direction

We are simply stating the *definition* of momentum above; similarly, recognize Newton’s second ‘law’ is merely the *vector definition* of force. When we use the phrase ‘gravitational potential’, we’re assuming Newton’s universal law of gravitation, $F=Gm_1m_2/r^2$ which in *100s of years*, has *never* seen violation.

Part 2; Antimatter and Time:

In ***every*** particle accelerator in the *history of physics*, ***every*** *time* we simulate ‘the creation event’ by smashing beams of nuclei/anti-nuclei against each other, ***equal*** amounts of matter and antimatter are produced. The immediate automatic question that should be in your mind is: *what happened to all the antimatter?*

There’s *only two* reasonable answers:
1. some natural process *destroyed* it *and/or*
2. some natural process *has hidden* it
Key obvious phrase: ‘natural process’; we’ll come back to this question later.

As the humorous fictional example above has illustrated, the passage of time for observers scattered throughout the universe, near neutron stars or out in flat space-time, ***always*** *progresses at different rates* depending on nearness to strong gravity sources. But it is ***fundamentally*** *important* to note that ***never***, *absolutely* ***nowhere*** in the universe, is *causality* ***violated***. This applies to antimatter as well. *No natural process associated with antimatter can violate causality.*

But what about gravitational conservation detailed above? Could antimatter have properties that ***seem*** to violate conservation but ***not really?***

Let's propose a *real physical object* called an antineutron star. What would its *properties* be? Well, the first attribute would be mass; its *mass range could not be* ***any different*** than that of matter neutron stars: 1.4 – 2.2 solar-masses. The next attribute should be about *time dilation*: would an antineutron star dilate time *exactly the same* as neutron stars or could it, ***without violating*** *causality or conservation*, somehow 'dilate' time *differently?*

A rubber band can *linearly only* be stretched or relaxed. Make even markings along its length; observe how those markings separate and merge while you stretch and relax the band. Time dilation corresponds to stretch; time compression corresponds to relax. Another analogy: a metal spring; observe how it takes pressure to compress the spring and tension to extend it. Force/energy is required either way. So it's conceivable that *antimatter could compress time*, speed time up, most importantly ***without violating causality nor conservation***.

Why temporal compression does not violate causality: causality is about the impossibility of future events causing past events; speeding time up has nothing to do with future events causing past events; temporal compression has nothing to do with violating causality.

Why temporal compression does not violate conservation:
1. if we simplify gravitation as mediated by time dilation, there is a superposition of dilations between two masses *causing* mutual attraction
2. between neutron stars and antineutron stars, there is a *surface where time is* ***flat***, and when there is *mass inequity* (as in most cases), *gravitational repulsion* until that surface is a plane bisecting a line through both stars
3. obviously, point 2 also applies to matter and antineutron stars – and – antimatter and neutron stars
4. not so obvious is *gravitational attraction between antineutron stars*; antimatter attracts and *can burn in thermonuclear reactions* although ***THREE TIMES FASTER*** than matter stellar fusion
5. *antimatter black holes self-destruct* because the event horizon is a surface where time goes to infinity which implies that Hawking evaporation is the rapid demise of *anything* more massive than the maximum neutron star, 2.2 solar-masses

Any extant antimatter galaxies would be *devoid of black holes* and *gravitational wave signatures* of antineutron star mergers should be *distinct* from signatures of neutron star mergers – especially when they end in black hole formation.

So where is all the antimatter? It’s all there: either as dead antineutron stars or galaxies devoid of black holes. AEgIS and LISA should both provide evidence for/against temporal compression as a property of antimatter. We only have *time* to tell .. This essay is dedicated to Hope Micheal, my daughter, who turns 2 in one month of time .. There it is again, that word..