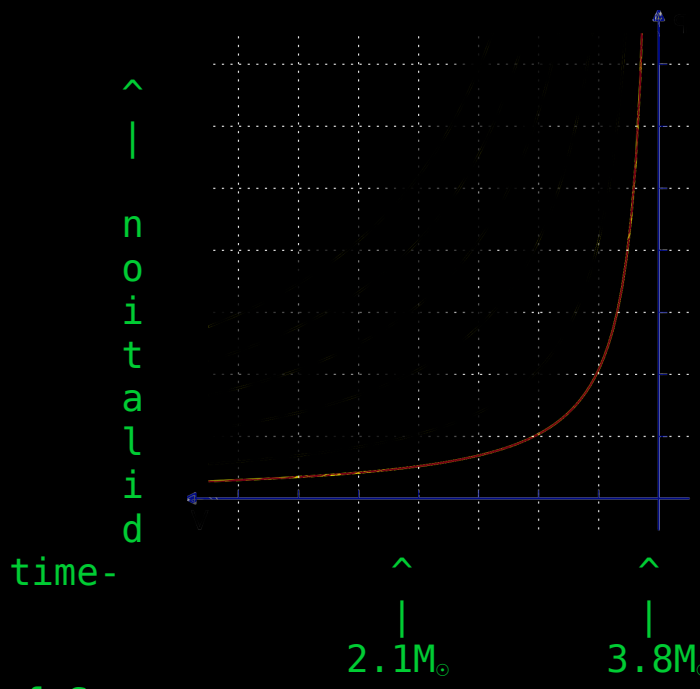
Event Horizons and the Ideal Gas Law

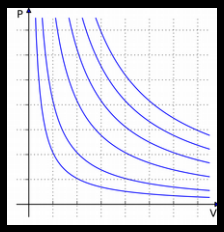
sgm, 2018/DEC/16



$M_\odot$ = mass of Sun

Note that at $2.1M_\odot$ the energy density is 1.13×10^{34} J/m^3
and that at $3.8M_\odot$ the energy density is 1.18×10^{34} J/m^3

Does the image above look familiar? It should; it was grabbed from:



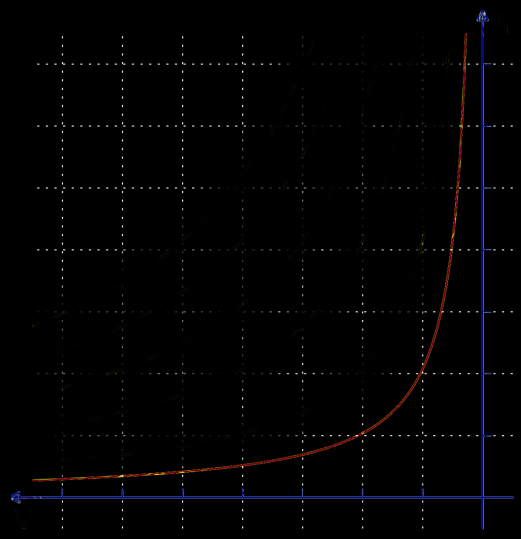
where PV=nRT, the ideal gas law
P & V are *inversely* related/*proportional* to each other
so if volume halves, pressure doubles
volume can never go to zero
as volume goes to zero, pressure goes to ∞

We know that there's a critical-mass/energy-density for black holes which is somewhere close to $3.8M_\odot$ so we can simply choose that value as our vertical asymptote. Because time-dilation is always greater than one, that is our horizontal asymptote.

For years I've been obsessed with the elasticity paradigm / analogy regarding time. It has certain advantages when we use the rubber-band analogy. But because time-dilation is *asymptotic* to event-horizons, we need other more

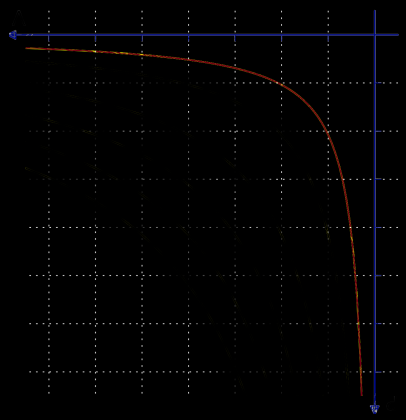
appropriate analogies. The simplest most obvious one is the ideal gas law.

We're going to use the graph above to try to understand antimatter:



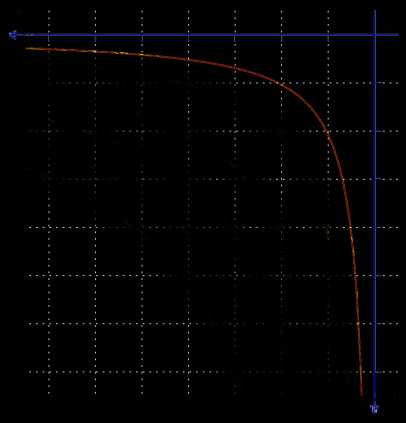
$M_\odot$ = mass of Sun

Any student of math knows there's two ways to reflect that graph: horizontally or vertically. If we reflect it horizontally, that implies some kind of symmetry about $3.8M_\odot$ which does not make sense (time-dilation should not decrease as mass increases). But if we flip it vertically, then it can:



As antimatter mass increases, dilation *decreases* to -∞.

Something is NOT right:



As antimatter mass increases, ***dilation decreases to -∞***.

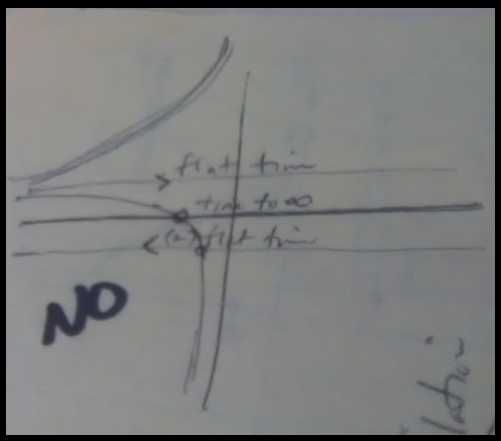
Let’s back up a little. When we reflect the graph on page one vertically, we need to choose the reflection axis:
A. we reflect through the x-axis
- XOR -
B. we reflect through the horizontal asymptote

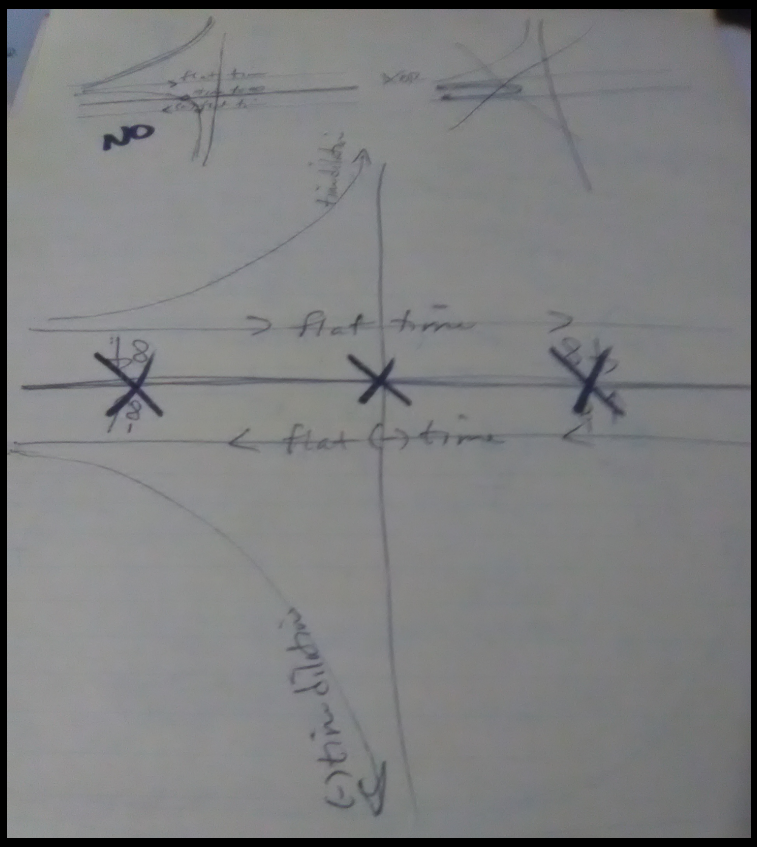
What makes more sense?

If we choose A, the horizontal asymptote is -1, matter-antimatter gravitation is repulsive, and anti-black-holes self-destruct: https://msu.edu/~micheal/2-Things-Science-Hates.pdf

~~However, if we choose B, the horizontal asymptote is 1 and some bizarre things happen:~~
~~either the graph CROSSES the x-axis~~
~~- with implications below~~

some interesting thoughts with confusing implications





more interesting thoughts with confusing implications

As you approach the x-axis, it represents from either side ∞ or -∞, time going to infinity and time going to negative infinity, *at the same time* which is inconsistent. The image above that, it indicates a mass-dilation curve crossing that same line AND another line where time is going negative – in the reverse direction. So that idea absolutely makes no sense. Nor does the x-axis just above. Folding the paper such that flat-time lines coincide makes more sense than trying to make sense of the others.

It would be interesting to try to solve the paradoxes offered above IF there was any hope of resolution. There is an interesting paper: "Exercise: Dark Matter as fields that evolve backward in time" at https://arxiv.org/pdf/1803.08531.pdf which obviously relates to the paradoxes above. The interested reader is encouraged to try.