

The Devil is in the Details

an explanation of baryon asymmetry, accelerating expansion rate, and dark energy via PABHs, primordial antimatter black holes – and – their interactions

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"In other words, Murphy's law strikes again: in the 14 **BILLION** years of our universe's existence, there must have been *direct hits* between PBHs and PABHs. My guess is *because they're faster, they dominated the mergers* losing matter 20% in the process."

-from Stephen+

If there's anything we despise, it's a lot of hand-waving combined with zero content. The statement above is *logical*, but that hardly gives credence to the idea. Because the previous paper depends so heavily on the statement above, we're little better than charlatans in a side-show without some kind of appropriate math to back it up.

What do we have as conditions?

- an actual real existing *topology* of our universe
- an expanding *volume*, depending on topology
- 14 billion year *time frame*
- the estimated *population statistics* over those 14
- the direct-hit *cross-section* for each member over those 14
- *merger dynamics*

Tall order? Anything for Stephen .. Since we don't have evidence to the contrary, we'll assume the simplest topology for our universe, a closed hyper-sphere [a closed hyper-torus would work just as well]. This should make volume calculations fairly straight forward. The time-frame is trivial. The population statistics we can represent by a suitably truncated and carefully chosen metric on $W(t)$, an infinite time-dependent vector accurately representing the populations of PBHs and PABHs over the time-frame. Metric here is used to mean a frequency-domain analysis of populations focusing on relevant sub-populations. Cross-

sections for each sub-population, in theory, should be calculable. Merger dynamics we'll represent with a conditional probability function: $P_{md}(A_d|m_r)=f_A(m_r)$ where:

P_{md} is the probability of merger dynamics

A_d = the event the PABH *dominates* in a collision

m_r = the *mass-ratio* m_A/m_M

m_A = the *mass* of the PABH

m_M = the *mass* of the [matter] PBH

f_A = the explicit probability function, $0 \leq f_A \leq 1$
 \leq , is less than or equal to

Further, we'll initially simplify the outcomes:

1. if $m_r \geq 1$, we'll assume the PABH dominates

and the new $m_A = m_{A-prev} + m_M$

we'll call this the *coup-option* because

all of the PBH is *absorbed into* the PABH

2. if $m_r < 1$, we'll assume the PBH dominates but

diminishes to $m_M - m_A$

we'll call this the *suicide-option* because

the *remaining* PBH is *less* the PABH

Because this is an initial endeavor, we'll ignore spin and charge considerations. Cross-sections are also simplified thusly: $P_m(m_{BH})=f_m(m_{BH})$ where:

P_m is the probability of a black hole mass direct hit

m_{BH} = the *mass* of the black hole

f_m = the explicit probability function, $0 \leq f_m \leq 1$
 \leq , is less than or equal to

f_m is initially chosen to be a *sigmoid function* of m_{BH} such that the inflection point has some physical relevancy. The range of f_m is 0 to 1 inclusive.

Pop-loss(t) = **f**(V(t),W(t),**P_m**,**P_{md}**) is a time-dependent vector function of volume, population statistics, direct hit cross-section, and merger dynamics. All but volume are vectors themselves. If the assumptions above are valid, the integral from t=0 to t=now of **f** normalized should equal 20%.

Discussion:

If only Stephen were still here. I miss his spunkiness. I'm fairly certain he'd not object to "simplify the outcomes" above if *only* because of the *labels*. I envision little dictators running around the cosmos with hand-vacs whilst all matter heads for the hills. I'm a little concerned with the expression "if it seems to good to be true", but it *only* applies **IF** Stephen had *actually considered* this scenario. True, it's *wacky enough* for his style, but the associated assumptions would have likely turned his stomach:

"Recall the characteristics of PABHs: they attract antimatter, they repel matter, and they do this **really fast** because they speed-up local time. So as they clean-house / clear the universe of baryonic antimatter, they *accelerate expansion* because they're growing [in numbers]. The 20% matter loss must have been incidental/friendly-fire."

-from Stephen+

Stephen wasting the last 4 years of his life is *nothing* compared to the father of Relativity, 20. If he had only known about the strong force; well, we can't cry over spilt milk. The implication that it's *at least analogous* to what happens outside the event-horizon of PBHs and PABHs should be encouraging. And if the past is *any* indication, we at least have time on our side.

I, personally, am not *too* worried about the details of **f** mentioned above; I'm fairly certain we can do it analytically without a single simulation. However, the Prize should go to someone who honestly did *not think* about the 20% **before** they started their work. Do we still operate on the honor-system? Not sure we ever did..

Anyway, I'm eternally grateful Stephen got to get out of this gravity well **before** he started flying with the angels he so adamantly denied.

sgm, 2018/JUN/18