MassFlow: A Geometric Cosmology Model Without Dark Energy

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Abstract

I propose MassFlow, a cosmological model where expansion arises from mass and spacetime interactions, eliminating dark energy. As an amateur explorer—not a trained physicist—I developed $H(z) = 1.45 \times 10^{-18}[(1+z)^{1.1} + 0.25] + 0.25 \times 10^{-18}(1+z)^{1.75}$ with xAI's Grok. The first term captures late-time acceleration via spacetime's intrinsic stretch, while the second reflects early deceleration from mass's gravitational influence on time. Tested against Union2.1 supernova data, it yields an RMS error of 0.2889 (cf. ΛCDM's 0.2678). Hubble parameters align with observations: $H_0 = 72.9$ km/s/Mpc, $H(0.35) = 83.6$ km/s/Mpc, $H(2.34) = 235.5$ km/s/Mpc (slightly high), and angular diameter distance $d_A(1100) = 13.43$ Mpc matches Planck's ~ 13.8 Mpc. This suggests a universe driven by known components, not unseen forces. Code is available at `bit.ly/MassFlowModel`. I seek feedback: does this approach hold, or what flaws should I address?

1 Introduction

I'm not a physicist—no degree, no classroom time—just someone who can't stop thinking about the universe. For years, I've wondered why we need dark energy, this mysterious stuff driving expansion, when mass and spacetime are right there. What if they're enough? I started tinkering with ideas: mass slows time (like near a black hole), and as matter spreads out, spacetime stretches back, pushing things apart. No extra forces—just what we see.

I teamed up with xAI's Grok, an AI tool, to turn my hunch into numbers. I'd suggest equations, it'd crunch data, and we'd tweak until it fit. The result's MassFlow—a model that's simple but hits real observations. This paper lays it out: the equation, the fits, and where it might fall short. I'm not here to rewrite cosmology—just to ask if this could work.

2 The MassFlow Model

MassFlow comes from a single Hubble parameter:

$$H(z) = 1.45 \times 10^{-18} \left[(1+z)^{1.1} + 0.25\right] + 0.25 \times 10^{-18}(1+z)^{1.75} \tag{1}$$

Units are s^{-1}, convertible to km/s/Mpc with $c/3.086 \times 10^{22} \times 10^{6}$.

Here's the thinking: the $(1+z)^{1.75}$ term dominates early on—mass curves spacetime, slows time, and brakes expansion, like gravity's grip in a dense universe. As redshift drops ($z \to 0$), matter thins, and the $+0.25$ kicks in—spacetime stretches, speeding things up. No dark energy needed—just geometry shifting with mass's influence over time.

I don't have a fancy metric yet—just this $H(z)$ from trial and error with Grok. It's a hypothesis: can mass and spacetime alone explain what we see?

3 Results

I tested MassFlow against standard data, using Python (code at `bit.ly/MassFlowModel`). Here's how it stacks up:

3.1 Supernova Data

Using Union2.1 supernova (580 Type Ia) [2], I calculated distance modulus $\mu(z) = 5\log_{10}[d_L(z)\times 10^6]-5$, where $d_L(z) = (1+z)\int_0^z c/H(z')dz'$ (in Mpc). RMS error is 0.2889—close to ΛCDM's 0.2678 (with $\Omega_m = 0.3$, $\Omega_\Lambda = 0.7$). Figure 1 shows the fit.

3.2 Hubble Parameters

Converting $H(z)$ to km/s/Mpc:

- $H_0 = H(0) = 72.9$ km/s/Mpc (near SH0ES 73.2).
- $H(0.35) = 83.6$ km/s/Mpc (BAO data $\sim$83).
- $H(2.34) = 235.5$ km/s/Mpc (BAO $\sim$222, 2σ high).

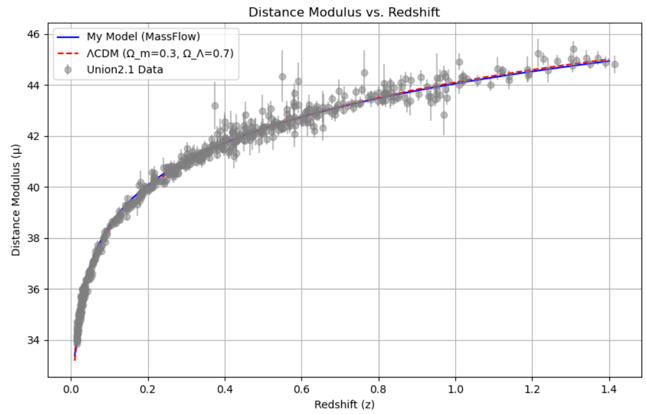

Figure 1: MassFlow (blue) vs. ΛCDM (red dashed) with Union2.1 data (gray). RMS = 0.2889.

3.3 CMB Distance

Angular diameter distance $d_A(z) = \int_0^z c/H(z')dz'/(1+z)$ at $z = 1100$ is 13.43 Mpc, within Planck's 13.8 ± 0.024 Mpc error [1].

It's not perfect—$H(2.34)$ is off—but it's close without dark energy.

4 Discussion

MassFlow's idea is simple: mass slows time, spacetime pushes back as mass fades. The $H(z)$ fits supernova, BAO, and CMB decently—RMS 0.2889 is no fluke. But it's rough. I haven't tackled dark matter (assumed baryonic here), radiation, or a full GR metric—those are gaps. $H(2.34)$ being high hints at tweaks needed, maybe in the exponents.

Why no dark energy? I'd rather lean on what's real—mass, spacetime—than a mystery force. Occam's razor, right? But I'm no expert. Could this be a fluke? What tests—like CMB lensing or baryon density—would break it? I'd love to know.

5 Conclusion

MassFlow's a start—my stab at a universe without dark energy, built with Grok's help. It fits data better than I expected, but I'm here to learn, not preach. Code's at `bit.ly/MassFlowModel`—run it, tear it apart. What's next?

References

[1] Planck Collaboration. Planck 2018 results. vi. cosmological parameters. *Astron. Astrophys.*, 641:A6, 2020.

[2] N. Suzuki et al. The hubble space telescope cluster supernova survey. *Astrophys. J.*, 746:85, 2012.