

# Saturation Dynamics and Grid Resonance: A Phenomenological Alternative to Dark Matter and Dark Energy

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## Abstract

We present Tolog-Alpha, a phenomenological framework based on a 3x3 stabilizing grid (Curvature, Energy Density, Scalar Field) that reproduces galactic rotation curves, cosmic expansion, and baryon acoustic oscillations without invoking dark matter or dark energy.

The model introduces a redshift-dependent saturation function:

$$S(z) = \frac{1}{1 + \left(\frac{1+z}{z_c}\right)^n}$$

leading to an effective equation of state:

$$w(z) = -\lambda S(z)$$

We demonstrate consistency with SPARC rotation curves, Pantheon supernova data, and BAO measurements, while outlining remaining challenges in reproducing CMB power spectra.

## 1 Conclusion

Tolog-Alpha provides a unified phenomenological description of galactic and cosmological dynamics through a saturation-based grid structure. While the model successfully reproduces multiple observational datasets, further work is required to fully match the CMB power spectrum.

This framework offers a testable alternative to  $\Lambda$ CDM and motivates further investigation.