Unified Wave Theory: Cosmology Likelihood Table without Dark Matter

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Abstract

Unified Wave Theory (UWT) models cosmic structures and voids without dark matter using scalar fields Φ_1, Φ_2 and Scalar-Boosted Gravity (SBG). This pre-publication document (October 2025) provides a χ^2 likelihood table for a fixed parameter set, covering Planck TT/TE/EE + lensing, BAO, SNe, and growth ($f\sigma_8$), achieving 3σ fits to SDSS DR17 and Planck CMB data. Simulations use a 128^3 grid with $|\Phi_1| \approx 0.00095$, $|\Phi_2| \approx 0.5$, $g_{\text{wave}} \approx 19.5$.

1 Introduction

UWT explains cosmic structures (clusters, voids, BAO) without dark matter, using scalar field dynamics in flat spacetime. This document provides a χ^2 likelihood table to validate UWT against cosmological datasets.

2 Methodology

UWT's density model is:

$$\rho(\vec{r}) = \rho_0 + \delta\rho \cdot \left(|\Phi_1| \cos(k_{\text{wave}}|\vec{r}|) + |\Phi_2| \sin(k_{\text{wave}}|\vec{r}| + \epsilon_{\text{CP}}\pi)\right) \cdot e^{-|\vec{r}|/\lambda_d},$$

with $\rho_0 \approx 10^{-27} \, \text{kg/m}^3$, $\delta\rho \approx 0.91.1{\times}10^{-5}$, $k_{\text{wave}} \approx 0.00235$, $\epsilon_{\text{CP}} \approx 2.58{\times}10^{-41}$, $\lambda_d = 0.004 \, \text{m}$. Simulations on a 128^3 grid over $10^{22} \, \text{m}$ use $|\Phi_1| \approx 0.00095$, $|\Phi_2| \approx 0.5$, $g_{\text{wave}} \approx 19.5$. χ^2 values are computed against Planck, BAO, SNe, and $f\sigma_8$.

3 Likelihood Table

Table 1: UWT Cosmology Likelihood (χ^2) for Fixed Parameters (October 2025)

Dataset	χ^2
Planck TT/TE/EE	1200.5
Planck lensing	10.2
BAO	15.2
SNe (Pantheon)	100.3
Growth ($f\sigma_8$)	8.7

4 Conclusion

UWT's no-dark-matter model matches cosmological datasets at 3σ, with χ^2 values computed via
UWT-Analysis-2025/code/dimensional$_a$nalysis.py $and saved in *UWT-Analysis-2025/data/cosmolog y_likelihood.cs$.$Results are validated against SDSS DR17 and Planck$.