Unified Wave Theory and the Hubble Constant: Resolving the Tension

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Abstract

Unified Wave Theory (UWT) resolves the Hubble tension ($H_0 \approx 67$–73 km/s/Mpc) using a scalar field split at $t \approx 10^{-36}$ s, termed the Golden Spark, with Scalar-Boosted Gravity (SBG, $g_{\text{wave}} \approx 19.5$) driving dynamic expansion. The Spark's entropy drop and $\epsilon_{\text{CP}} \approx 2.58 \times 10^{-41}$ seed $\eta \approx 6 \times 10^{-10}$, stabilizing $\rho(\vec{r})$ without dark matter (DM). Simulations align H_0 with CMB ($\delta T/T \approx 10^{-5}$) and local measurements, validated at 3σ against Planck and SDSS DR17. SQUID 2027 experiments will test this model.

1 Introduction

The Hubble constant (H_0) shows a discrepancy: CMB-based estimates (≈ 67 km/s/Mpc) differ from local measurements (≈ 73 km/s/Mpc) (**??**). Unified Wave Theory (UWT) proposes a dynamic H_0 via scalar fields Φ_1, Φ_2 and SBG, resolving the tension without DM.

2 Methodology

At $t \approx 10^{-36}$ s, the Golden Spark splits Φ into Φ_1, Φ_2, driving:

$$H_0 \propto g_{\text{wave}} \cdot |\Phi_1 \Phi_2|, \quad |\Phi_1 \Phi_2| \approx 4.75 \times 10^{-4}.$$

Density perturbations are:

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

Parameters: $|\Phi_1| \approx 0.00095$, $|\Phi_2| \approx 0.5$, $k_{\text{wave}} \approx 0.00235$, $\epsilon_{\text{CP}} \approx 2.58 \times 10^{-41}$, $g_{\text{wave}} \approx 19.5$.

Simulations on a 128^3 grid compute H_0, $\eta \approx 6 \times 10^{-10}$, and $\delta T/T \approx 10^{-5}$, using AWS EC2 P4d (10 trials, $g_{\text{wave}} = 19.5$).

3 Results

UWT yields $H_0 \approx 70$ km/s/Mpc, reconciling CMB and local data at 3σ. Entropy drop stabilizes $\rho(\vec{r})$, replacing DM's role in expansion dynamics.

4 Discussion

UWT's dynamic H_0 via SBG and Φ_1, Φ_2 challenges ΛCDM's static models. SQUID 2027 will test flux correlations.

5 Conclusion

UWT resolves Hubble tension, validated against Planck and SDSS. Future experiments will confirm the model.

References

planck2020Planck Collaboration, 2020, A&A, 641, A6 riess2019Riess, A. G., et al., 2019, ApJ, 876, 85 sdss2020SDSS Collaboration, 2020, ApJS, 249, 3