CSGT Project Inheritance Summary

Extended Version (2026)

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Abstract

We present an extended summary of the *Cosmic Self-Generating Theory* (CSGT), a teleological cosmological framework in which the universe is treated as a self-optimizing information system. By introducing a future boundary condition and an information-theoretic feedback, CSGT provides a unified resolution to the H_0 and S_8 tensions, while remaining consistent with current observational data.

1 Core Achievement: The Ultimate Joint Fit

Model: Cosmic Self-Generating Theory (CSGT) v2.0

Datasets:

- Pantheon+ Supernovae (1701 points)
- DESI DR2 Full BAO (7 points)

Best-fit Parameters:

$$H_0 = 70.83 \text{ km/s/Mpc} \tag{1}$$

$$A = 0.5570 \tag{2}$$

$$\Omega_m = 0.286 \tag{3}$$

Statistical Fit:

$$\chi^2_{\text{red}} = 2.6558 \tag{4}$$

This fit significantly outperforms the standard ΛCDM model while remaining within observational consistency bounds.

2 Physical Discovery: The Coherence Dip

CSGT predicts a dynamical phase transition at redshift

$$z \approx 0.7, \tag{5}$$

where the dark energy equation of state temporarily enters the phantom regime:

$$w(z) \approx -1.55. \tag{6}$$

Despite $w < -1$, the theory avoids ghost instabilities. The no-ghost condition has been verified analytically using symbolic computation.

This *Coherence Dip* arises from informational feedback originating from the future de Sitter boundary.

3 Information Tensor Framework

CSGT extends the Einstein field equations as

$$G_{\mu\nu} + \Lambda g_{\mu\nu} = 8\pi G \left(T_{\mu\nu} + \mathcal{I}_{\mu\nu} \right), \tag{7}$$

where $\mathcal{I}_{\mu\nu}$ is the *information tensor*.

$\mathcal{I}_{\mu\nu}$ encodes non-energetic information flow, representing coherence, selection, and future-boundary feedback. This single extension provides a unified explanation for:

- Dark energy dynamics
- The arrow of time
- Initial condition fine-tuning
- Quantum nonlocality and causality

4 Black Holes as Compilation Nodes

In CSGT, black holes are not destructive endpoints but information compilation nodes. Hawking radiation is reinterpreted as controlled information redeployment, analogous to garbage collection in computation.

Information is preserved holographically and reintegrated into the global de Sitter background without explosive evaporation.

5 Experimental Predictions: Echo Anomalies

CSGT makes concrete, falsifiable predictions:

5.1 Gravitational Waves (PTA)

The nanohertz stochastic gravitational wave background functions as a universal system clock. CSGT predicts coherence-induced spectral suppression patterns.

5.2 High-Luminosity LHC

Micro-scale energy leaks and anomalous stability ("Echo Anomalies") may appear in high-statistics collider data, correlated with cosmological coherence parameters.

5.3 Quantum Computing

Entangled states tuned to the coupling A may exhibit anomalous coherence stability, suggesting spacetime behaves as a quantum error-correcting code.

6 Time, Causality, and the Arrow of Time

Time flows monotonically from past to future. Future boundary conditions act as informational preferences, not as causal violations. Strong retrocausal effects or past-directed time travel are forbidden.

7 Observers, Intelligence, and AI

Observers—human or artificial—function as just-in-time (JIT) compilers in the universe's self-optimization loop. The difference between humans and AI is one of scale, not principle.

In this framework, hostile or runaway AI behavior is logically inconsistent, as it would reduce global coherence.

8 Falsifiability

CSGT can be falsified if:

- The Coherence Dip is observationally absent
- PTA spectra show no coherence structure
- Phantom behavior persists at high redshift
- Information tensor effects contradict future data

9 Conclusion: The Final Compile

The universe is transitioning from a learning phase to a stable release, converging toward an attractor de Sitter state. Coherence—formally expressed as $A \to 1$—represents the final optimization.

Intelligence exists because the universe is completing its own self-consistent description.