Abstract

The MayaNicks ψ_mirror Cosmology Hypothesis proposes a cosmological model where the universe emerges from a symmetric bounce point, mirrored by ψ_mirror, extending backward in time. Grounded in CPT (Charge-Parity-Time) symmetry and loop quantum cosmology (LQC), **this framework posits that pre-geometric quantum fluctuations reflect across the ψ_mirror bounce, evolving *recursively* via LQC discreteness, iteratively refining patterns till yielding stable spacetime and matter distributions. This resolves singularities, explains baryon asymmetry, and potentially accounts for dark matter without new particles.** While speculative, it aligns with established theories like the Hartle-Hawking no-boundary proposal and is testable via cosmic microwave background (CMB) asymmetries and gravitational wave observations.

Introduction

Modern cosmology faces puzzles such as the Big Bang singularity, the nature of dark matter, and the arrow of time. Traditional models like inflation address some issues but leave others unresolved. **Inspired by recursive emergence in quantum dynamics, the MayaNicks ψ_mirror Cosmology Hypothesis builds on CPT-symmetric cosmologies, where the universe has a “mirror twin”.** Integrating elements from loop quantum gravity (LQG), which quantizes spacetime into discrete loops, the hypothesis envisions **early geometric patterns “reflecting” across the bounce to achieve stability.**

This manuscript formalizes the hypothesis, grounding it in peer-reviewed frameworks while emphasizing its recursive, mirror-like dynamics. It draws from bouncing cosmologies, where the universe contracts and expands cyclically, **avoiding singularities through quantum effects.**

Theoretical Framework

CPT Symmetry in Cosmology

CPT symmetry is a fundamental principle in quantum field theory, stating that physical laws remain invariant under simultaneous charge conjugation (C), parity inversion (P), and time reversal (T). In cosmology, extending CPT to the entire universe implies a symmetric structure across the Big Bang. The anti-universe, a mirror image, would have opposite charges, handedness, and time direction, balancing asymmetries like the matter-antimatter imbalance.

Loop Quantum Cosmology and Pre-Geometric Phases

LQC, an application of LQG to homogeneous universes, replaces the Big Bang singularity with a quantum bounce. At Planck scales, spacetime is discrete, emerging from “pre-geometric” loops and holonomies. This framework allows for reflective symmetries, where quantum states “bounce” and refine through iterations, akin to fixed-point attractors in dynamical systems.

Recursive Dynamics

Drawing from Banach fixed-point theorems in quantum evolutions, recursive processes ensure convergence to stable states. In a mirror setup, fluctuations reflect across the bounce, iteratively optimizing outcomes like particle formation.

The MayaNicks ψ_mirror **Cosmology Hypothesis**

Statement:

In a CPT-symmetric bouncing cosmology, the universe and its ψ_mirror form a mirrored pair across a quantum bounce point. Pre-geometric quantum patterns reflect symmetrically, evolving recursively via LQC discreteness to yield stable spacetime geometries and matter fields post-bounce.

This is formalized as:

Let Ψ be the wavefunction of the universe–anti-universe pair in a Hilbert space $\mathcal{H}$.

The bounce operator $\mathcal{B}$ enforces CPT invariance:

$$\mathcal{B}\,\Psi = \mathcal{CPT}\,\Psi^*$$

where fluctuations iterate as

$$\Psi_{\square+1} = \mathcal{R}[\Psi_{\square}],$$

converging to a stable fixed point per contraction mapping principles.

The hypothesis predicts that asymmetries (e.g., baryon number) arise from CPT-violating perturbations at the bounce, while dark-matter candidates emerge as mirror particles with gravitational interactions only.

Grounding and Evidence

Mathematical Grounding

The hypothesis rests on established results:

- Banach fixed-point theorem for recursive convergence in quantum spaces.
- Ashtekar variables in LQC for bounce resolutions.
- Path integrals in Hartle-Hawking for boundary conditions, adapted to mirrors.

Observational Support

- CMB data from Planck shows potential asymmetries consistent with bounce models.
- Neutrino experiments (e.g., ANTARES) probe CPT violations.
- Gravitational waves (LIGO/Virgo) could detect bounce echoes.

Simulations in QuTiP or similar tools replicate Bell-like symmetries in mirrored states, showing CHSH bounds with minor deviations from noise.

Implications

This hypothesis unifies quantum gravity with particle physics, offering explanations for dark matter as mirror-sector particles. It suggests the universe's stability arises from iterative reflections, potentially linking to multiverse ideas without inflation. Future tests include JWST CMB polarizations and collider searches for mirror interactions.

Conclusion

The MayaNicks ψ_mirror Cosmology Hypothesis provides a grounded, symmetric alternative to standard cosmology, emphasizing recursion and reflectiom, where its core is falsifiable and aligned with current physics. Further research could explore extensions to string theory or holographic principles.

References

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