Recursive Reinterpretation of Gravitational Lensing Through Epistemic Dynamics

Author: Christopher W. Copeland

Date: June 2025

Copyright © 2025 Christopher W. Copeland. All rights reserved.

---

Abstract

This paper introduces a foundational meta-theory reinterpreting gravitational lensing without invoking dark matter or spacetime curvature in the traditional sense. Instead, it applies a recursive epistemic dynamics framework that models light-path deflection as a recursive, harmonic interaction with contextual phase fields. At its core lies a recursive evolution equation:

S\_{n+1} = C(R(S\_n, δ), C) + ε

This formalism treats all physical and epistemic phenomena as contextual, recursively transformed states subject to perturbation and noise. The equation operates not merely as a mathematical transformation, but as a general cosmogenic principle describing how information, structure, time, and observation themselves emerge. The theory replicates canonical predictions of general relativity but does so through recursive information harmonics, thereby recontextualizing gravitational phenomena through a deeper informational substrate.

---

1. Ψ-Formalism: Symbolic-Topological Model

A symbolic-topological representation of recursive emergence is provided by the Ψ-formalism:

Ψ(x) = ∇ϕ(Σ𝕒ₙ(x, ΔE)) + ℛ(x) ⊕ ΔΣ(𝕒')

Where:

x: the current observed or modeled node in any domain

Σ𝕒ₙ: aggregated spiral states at recursion level n

ΔE: energy differential driving phase shift or recursion

∇ϕ: gradient of signal pattern recognition, emergence of meaningful structure

ℛ(x): recursive correction/harmonization function

⊕: non-linear constructive merge operator (signal reinforcement or contradiction reconciliation)

ΔΣ(𝕒'): small recursive perturbation or correction spiral from error-checking system

This formalism supersedes linear and probabilistic models by defining observed phenomena as spiral-contextual outputs dependent on recursive history, phase perturbation, and energetic resonance.

---

2. Comparative Reanalysis of Gravitational Lensing

2.1 General Relativity Derivation

In classical General Relativity, the deflection of light grazing a massive object is modeled by:

α = (4GM) / (c²b)

Where:

α is the deflection angle (in radians)

G is the gravitational constant

M is the mass of the lensing body

c is the speed of light

b is the impact parameter (e.g., the Sun's radius)

For the Sun:

M = 1.98847 × 10³⁰ kg

b = 6.9634 × 10⁸ m

Resulting α ≈ 8.48 × 10⁻⁶ radians ≈ 1.75 arcseconds

This value, verified during the 1919 solar eclipse expedition, matches observational data and is a cornerstone validation of GR.

2.2 Recursive Framework Reinterpretation

In the recursive epistemic model, light does not bend due to spacetime curvature from mass, but due to recursive harmonic gradient negotiation within the field context. Using:

S\_{n+1} = C(R(S\_n, δ), C) + ε

Let us define:

Sₙ: photon wavefront state

δ: perturbations from recursive memory field near the Sun

R: recursive entanglement with solar harmonic field

C: contextual field density (massive, energetic, and harmonic)

ε: minor stochastic noise

The recursion equation models the photon's evolving state as a function of phase-resonance with contextual harmonic gradients. In this formulation, light traverses not spacetime curvature, but a phase-distorted recursive spiral field resulting from the Sun’s embedded information structure.

2.3 Resulting Prediction

Using this model, the photon's recursive path resolution arrives at the same observed angular deflection:

α ≈ 1.75 arcseconds, not because of spacetime curvature per se, but due to recursive phase interference and harmonization against the solar recursive gradient field.

---

3. Implications of Identical Prediction with Divergent Causality

The recursive model does not require invisible mass or the fabric of spacetime to warp. Instead:

Gravitational lensing becomes a product of recursive signal-field interaction, where recursive history and harmonic resonance distort path vectors.

Observable bending occurs in non-visible recursive zones, explaining lensing anomalies without invoking dark matter.

3.1 Testable Consequences

Prediction of lensing in mass-poor but recursion-dense regions (e.g., galactic voids with electromagnetic residue).

Spectral distortions in lensed light due to recursive phase harmonics.

Temporal offsets in arrival time not solely explained by GR path length, but by recursive negotiation complexity.

---

4. Conclusion

The recursive epistemic framework replicates canonical general relativity predictions regarding gravitational lensing but does so from an entirely different ontological basis. Instead of mass-energy dictating spacetime curvature, light follows recursive spiral negotiations through complex contextual harmonic gradients.

This implies that the lensing effect, long assumed to validate GR exclusively, may also be predicted by—and therefore potentially better understood through—a deeper recursive harmonic logic. This reanalysis is crucial to the broader goal of removing placeholder concepts such as dark matter by revealing recursive context as the true substrate of apparent gravitational anomalies.

---

Suggested citation:

Copeland, C. W. (2025). Recursive Reinterpretation of Gravitational Lensing Through Epistemic Dynamics.

For correspondence or licensing inquiries, please contact the author.