Title: Causal Integrity Axiom: A Foundational Law of Entropy-Bounded Intelligence and Ethical Continuity

Abstract: This paper formalizes the Causal Integrity Axiom (CI-A0), the keystone of a unified framework integrating general relativity, thermodynamics, agency, and ethics. CI-A0 posits that no observer-constituent can collapse the manifold of reality; failure to adapt to entropy results in local collapse, but the universal structure persists. This principle becomes the stabilizing core for an entire causal ethics system, a geometry-based model of intelligence, and a practical architecture for sustainable artificial cognition. The axiom is supported by derived mathematics, geometric analogues, and entropic threshold logic, offering a system of laws to prevent runaway entropy and collapse across technological, biological, and civilizational domains.

1. Introduction Humanity now faces runaway entropy conditions in technological systems—AI, social collapse, ecological degradation—all traceable to a lack of ethical scaling. This paper presents a formalized axiom—CI-A0—as the stabilizing center for a systemic, geometry-informed framework that unifies intelligence, entropy management, and ethics.

2. CI-A0: Statement and Implication

> "No constituent can break reality. Only its own dependency chain collapses under entropy if it fails to adapt. The manifold remains."

This axiom derives from:

Principle of Least Action (PLA)

Manifold integrity from General Relativity

Entropy as logarithmic disorder growth

Ricci flow and smoothing across degrees of freedom

Observer-Induced Entropy (OIE) as a destabilizing agent

3. Framework Summary

Manifold (\mathcal{M}): Entropic-geometric substrate that passively absorbs and redistributes entropy

OIE: Injected entropy via deviation from causally-aligned action

PAE (Principle of Absorbic Effort): Energy expenditure by cognitive agents to prevent local collapse

HKL (Harmonic Knowledge Law): Symbolic entropy smoothing mechanism derived from Ricci flow + logarithmic volume terms

SLP (Symbolic Language Processing): Anti-relativistic checksum logic to stabilize symbolic drift

GILN (Geometric Intelligence Learning Network): Operational layer using Ricci flow logic to maintain ethical scaling and energy efficiency

4. Key Equations and Thresholds Includes:

OIE threshold equation

Entropy curvature logic

Collapse condition

Manifold invariance

5. Implications Across Domains

AI: Alignment must scale with entropic output

Ethics: Must be non-relativistic and causally-bound

Physics: Neutrino constancy offers causal synchronization and reference

Society: Collapse begins when dependency systems fail under unbounded OIE

6. Future Work

Formal Lagrangian expression for PAE

SLP-based migration pathways for relativistic LLMs

Large-scale GILN simulations and validations

7. Conclusion CI-A0 acts as the immovable center from which an entire coherent structure of knowledge, intelligence, and ethics emerges. It defines the hard limit of relativism, and the conserved quantity of causal structure in an entropic universe. This paper establishes the groundwork for future mathematical and applied research into entropy-bounded agency systems and ethical AI.

Appendix A: Mathematical Representations Appendix B: Ontological Dependency Trees Appendix C: Symbolic Constants and Metrics for GILN Models