1. Draft Collapse Hamiltonian and Lagrangian

We propose a symbolic Hamiltonian for collapse evolution:

$$
H(Q_t) = -\lambda K(Q_t) + \eta H_C(Q_t)
$$

Where:
- $K(Q_t)$: Algorithmic complexity of system state
- $H_C(Q_t)$: Observer memory entropy
- λ, η: Tunable weighting parameters

Collapse occurs when:

$$
\Delta H < \epsilon \quad \text{and} \quad \hat{C}(Q_t) = \arg\min_a K(Q_{t+1} \mid A_t = a)
$$

The Lagrangian is defined as:

$$
\mathcal{L}(Q_t) = K(Q_{t+1}) - K(Q_t)
$$

Minimizing $\mathcal{L}$ corresponds to selecting transitions that compress information most effectively. This formulation could be extended into path integral form via compressibility-weighted action:

$$
S = \sum_t \mathcal{L}(Q_t)
$$

which selects optimal information trajectories.

2. Toward General Relativity Integration

We relate information structure to geometric curvature via:

$$
R(x) = \nabla^2 K(x)
$$

Next steps:
- Simulate $\nabla^2 K$ fields on 2D/3D manifolds
- Compare with solutions to Einstein field equations in flat, Schwarzschild, or FLRW spacetimes
- Approximate energy density from symbolic pattern gradients:

$$
T_{\mu\nu} \sim \partial_\mu K \cdot \partial_\nu K
$$

Compressibility gradients act as a surrogate for stress-energy fields, suggesting an information-geometric unification route.

3. Proposed arXiv Abstract (v1.0)

We propose a recursive, compressibility-driven model of quantum collapse and emergent spacetime structure. In this framework, collapse events preferentially select outcomes that minimize conditional algorithmic complexity. Observers are defined as memory-stable systems with predictive entropy thresholds that guide collapse resolution. Spacetime curvature emerges as a second derivative of local symbolic compressibility, yielding Ricci-like behavior from information structure. We formalize collapse as a Hamiltonian process that selects paths with maximal compressive gain and outline testable predictions via symbolic photonic experiments.

: quant-ph, gr-qc, cs.IT, math.IT