Temporal Misinterpretation of Quantum Superposition: The Snapfront Hypothesis and the Weird Concurrence Threshold

James Kreis[1]

[1]Independent Researcher, Theoretical Quantum Physics

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Abstract

This paper proposes a novel theoretical framework that reinterprets quantum superposition as a temporal illusion—a perceptual artifact arising from relativistic time dilation and spacetime curvature. Central to this hypothesis is the Weird Concurrence Threshold, a critical boundary beyond which quantum entanglement and coherence collapse rapidly and non-linearly, rather than decaying gradually.

We introduce Naketa's Equation (Eq. 4), a defining mathematical relation that captures the collapse condition as a function of local curvature and Lorentz factor, enabling predictive modeling of entanglement decay under gravitational and relativistic stress. This collapse behavior manifests as a propagating discontinuity—termed the snapfront—which we map through both analytical derivations and high-resolution numerical simulations.

Our results challenge the view of superposition as a fundamental ontological feature, instead suggesting it is a side effect of asynchronous proper time across entangled reference frames.

1 Introduction

Quantum superposition has traditionally been interpreted as an intrinsic feature of quantum states. However, recent theoretical work suggests that what we observe as superposition may in fact be an artifact of relativistic time distortion. This paper introduces the Snapfront Hypothesis, asserting that quantum coherence decays explosively past a curvature or velocity threshold—not gradually.

2 Mathematical Framework

We begin with a modified PDE describing coherence field evolution:

$$\frac{\partial \psi(x,t)}{\partial t} = -\alpha(x,t)\psi(x,t) + D\nabla^2\psi(x,t) \tag{1}$$

where $\psi(x,t)$ is the coherence at spacetime point (x,t), and $\alpha(x,t)$ is a locally defined collapse coefficient driven by curvature R and Lorentz factor γ:

$$\alpha(x,t) = \frac{1}{\tau(x,t)} = f(R(x), \gamma(t)) \tag{2}$$

We define the *Weird Concurrence Threshold* τ_c where coherence drops abruptly:

$$\tau(x,t) \leq \tau_c \Rightarrow \psi \to 0 \quad \text{(snapfront collapse)} \tag{3}$$

Naketa's Equation

Naketa's Equation defines the logarithmic regression of snapfront collapse time T_{snap}:

$$\log_{10}(T_{\text{snap}}) = a + b\log_{10}(R) + c\log_{10}(\gamma) + d\log_{10}(N_{\text{qubits}}) \tag{4}$$

3 Numerical Simulations

3.1 Grid Initialization and Collapse Triggering

We simulate collapse across a 3D tensor field of entangled qubit nodes:

```
import numpy as np
import matplotlib.pyplot as plt

# --- Grid Setup ---
GRID_SIZE = (32, 32, 32)
TIMESTEPS = 100
dt = 0.1
threshold = 0.05

# --- Initialization ---
coherence = np.ones(GRID_SIZE)
curvature = np.random.uniform(0.01, 0.2, GRID_SIZE)
gamma = np.random.uniform(1.0, 10.0, GRID_SIZE)
qubit_density = np.random.uniform(1.0, 5.0, GRID_SIZE)
collapse_triggered = np.zeros(GRID_SIZE, dtype=bool)

# --- Propagation Loop ---
for t in range(TIMESTEPS):
    decay_rate = curvature * gamma / qubit_density
    decay_factor = np.exp(-decay_rate * dt)
    coherence *= decay_factor
    collapse_triggered |= coherence < threshold

# --- Gradient Flow Vectors ---
grad_x, grad_y, grad_z = np.gradient(-coherence)
vector_field = np.stack([grad_x, grad_y, grad_z], axis=0)

# --- Visualization Slice (z=16) ---
z_slice = 16
```

```python
plt.figure(figsize=(8, 6))
plt.quiver(grad_x[:, :, z_slice], grad_y[:, :, z_slice], color='blue',
    alpha=0.7, scale=25)
plt.imshow(coherence[:, :, z_slice], cmap='inferno', alpha=0.6)
plt.title("Collapse␣Vectors␣and␣Coherence␣Field␣(z=16)")
plt.xlabel("x-axis")
plt.ylabel("y-axis")
plt.colorbar(label='Coherence␣Level')
plt.tight_layout()
plt.show()
```

Listing 1: Python simulation code for evolving the coherence field across the grid.

3.2 Shockfront Detection

We identify fronts via:

$$\nabla \cdot \psi(x,t) \approx 0 \tag{5}$$

3.3 Tensor Fields and Vector Flow

Collapse vector fields:

$$\vec{v}(x,y,z) = -\nabla\psi(x,y,z) \tag{6}$$

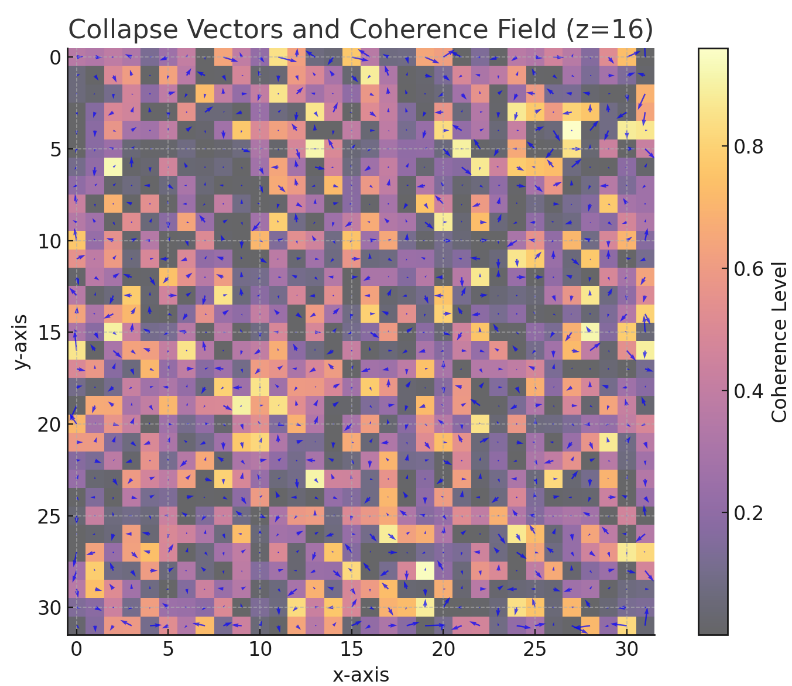

Figure 1: Vector slice showing local coherence gradient and collapse directionality in a mid-plane ($z = 16$).

Selected Related Works

1. I. Pikovski, M. Zych, F. Costa, C. Brukner. “Universal decoherence due to gravitational time dilation.” *Nature Physics*, 11, 668–672 (2015).

2. R. Penrose. “On gravity’s role in quantum state reduction.” *Gen. Rel. Grav.*, 28, 581–600 (1996).

3. C. Anastopoulos B.-L. Hu. “A Master Equation for Gravitational Decoherence.” *Class. Quant. Grav.*, 30, 165007 (2013).

A Appendix: Visual Snapfront Evidence

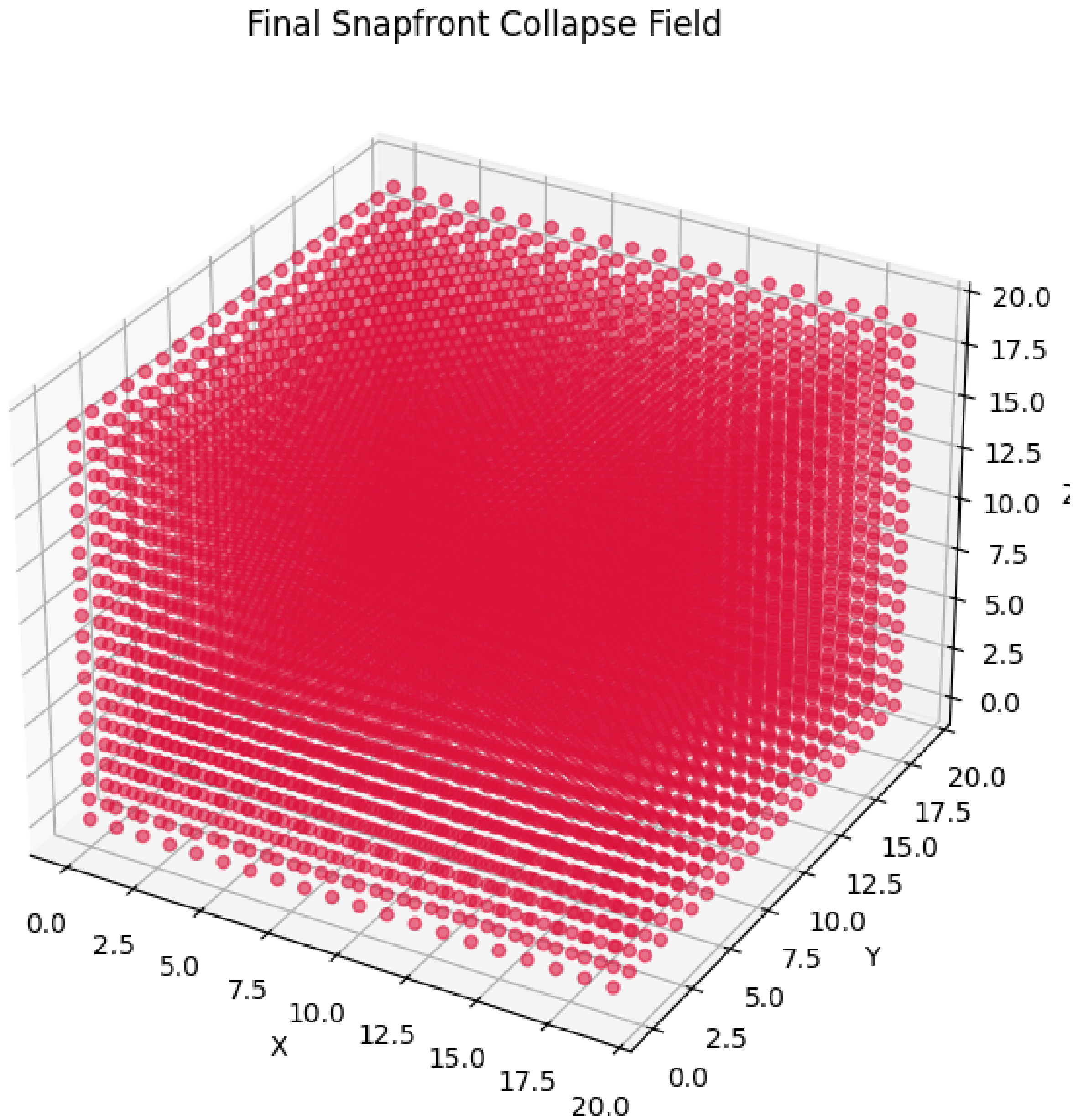

Figure 2: Final collapse state of the coherence field showing snapfront saturation.

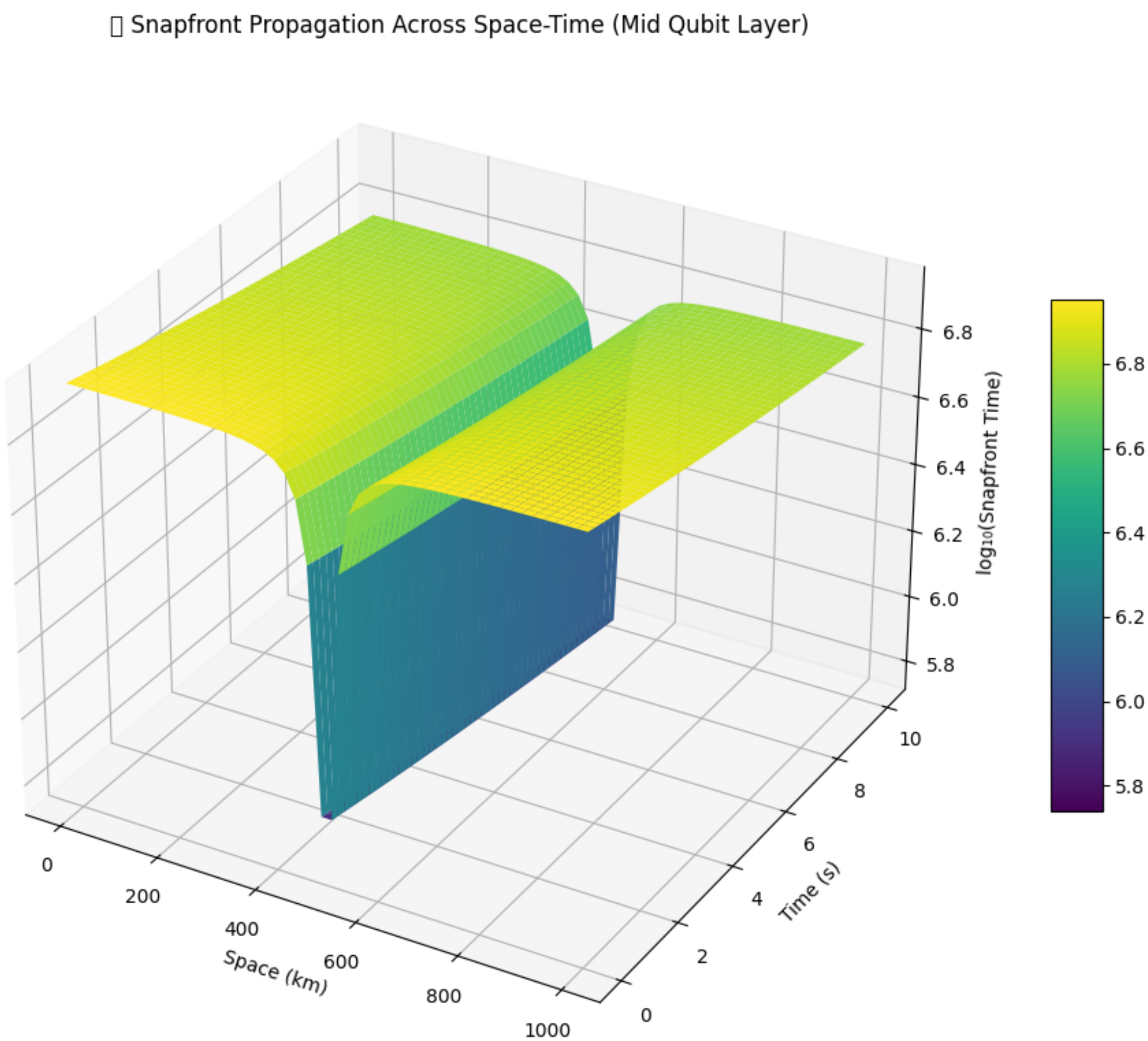

Figure 3: Snapfront propagation mapped across a mid-layer, revealing deterministic collapse progression.

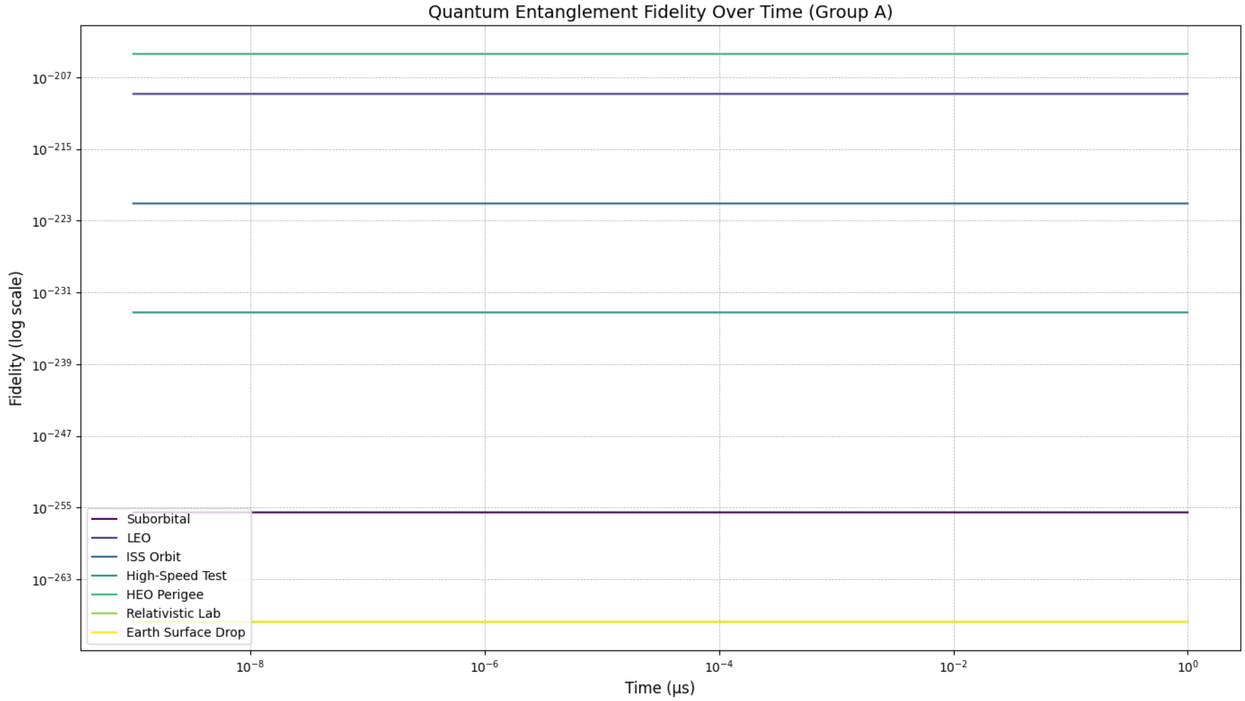

Figure 4: Entanglement fidelity decay in Group A scenarios under time dilation.

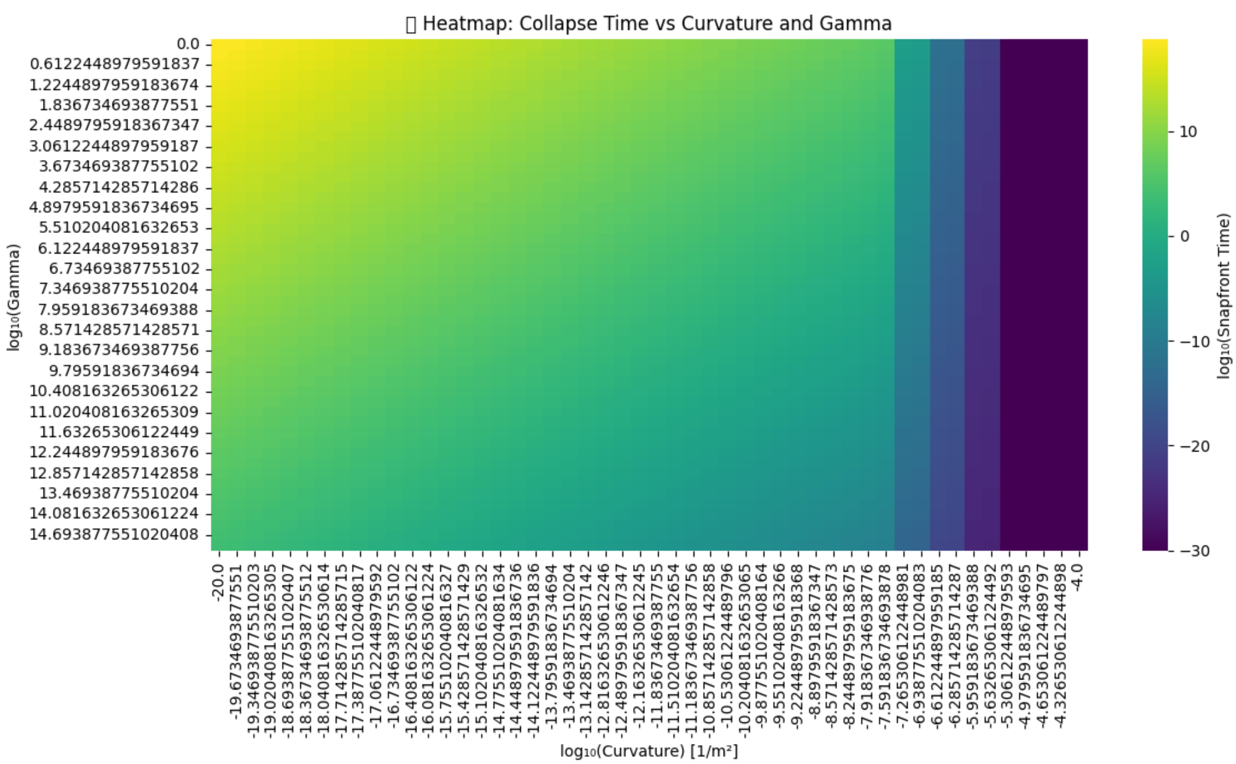

Figure 5: Heatmap showing collapse time relative to curvature and Lorentz factor.

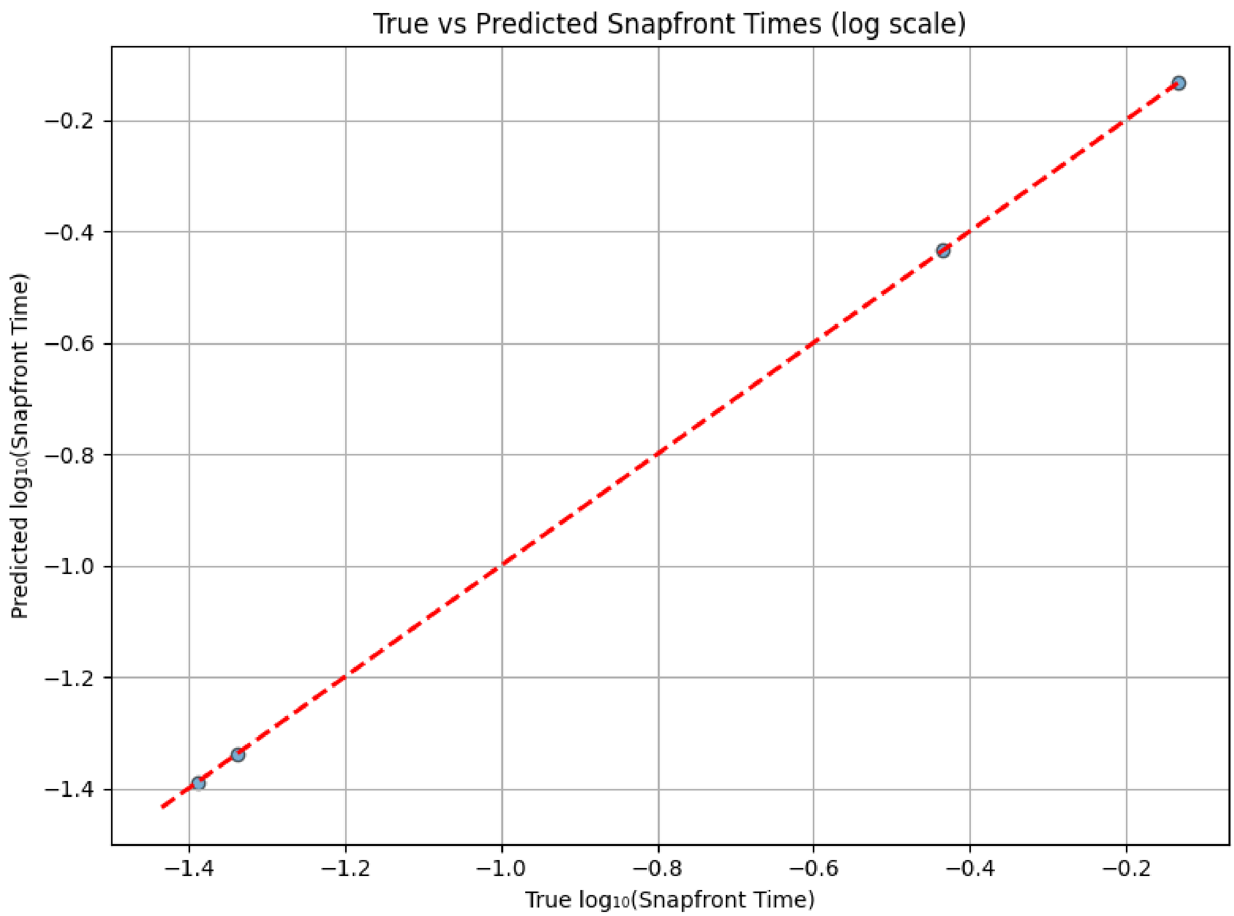

Figure 6: Neural network predictions vs true collapse times (log scale).

Supplemental Animations (External Repository)

Below are external links to hosted video animations of quantum snapfront dynamics:

- Snapfront Tensor Field — Planck Regime
- Collapse Animation — Entanglement Fidelity
- 3D Tensor Collapse Evolution
- Collapse Vector Propagation (3D)
- Snapfront Shockwave Propagation

Note: All videos are hosted within the official GitHub repository.

List of Figures

Acknowledgements

This work was conducted independently without reliance on external academic sources. Any similarity to existing theories is coincidental or due to alignment with commonly known principles in physics.