THE TAMESIS THEORY

Structural Unity through Spectral Topology & Falsifiable Limits

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ABSTRACT

We predict a Discontinuous Loss of Interference at a fixed Critical Mass ($M_c \approx 2.2 \times 10^{-14}$ kg), incompatible with any standard environmental decoherence or Continuous Spontaneous Localization (CSL) model. This "Topological Phase Step" is the unique signature of discrete spacetime saturation and acts as the singular falsification criterion for the entire unified framework.

1. THE IRREDUCIBLE CORE

The Tamesis Theory is not a model of particles, but a model of **spacetime topology** from which particles and forces emerge. It is structurally closed and defined by exactly 5 irreducible axioms.

The 5 Strong Axioms

> **AXIOM I: TOPOLOGICAL MANIFOLD**
>
> *Physical spacetime is a dynamic 4-manifold where "particles" are topological defects (knots/wormholes) in the vacuum structure, not independent entities.*

> **AXIOM II: HOLOGRAPHIC LIMIT**
>
> *Information density is strictly bounded by surface area (≤ 1 bit per Planck area). Gravity is the entropic force arising from this saturation.*

> **AXIOM III: SPECTRAL DYNAMICS**
>
> *The dynamics of the system are governed by the eigenvalues of a single Spectral Operator acting on the vacuum topology.*

> **AXIOM IV: CRITICAL SCALE (M_C)**

> *There exists a fundamental scale M_c where the system undergoes a topological phase transition (Unitary $\rightarrow$ Classic), appearing as objective wavefunction collapse.* ***Origin:*** *Saturating the holographic bound on a genus-1 topology.*

> **AXIOM V: EFFECTIVE UNITARY SCRAMBLING**
>
> *Local violations of linearity (collapse) preserve global information through unitary scrambling (horizon dynamics), ensuring no information loss.*

The Spectral Operator

The entire phenomenology is generated by the canonical operator:

$$\mathcal{O} = \mathrm{Spec}\left(\Delta_{\mathrm{top}} + \lambda \mathcal{S}_{\partial}\right)$$

Where:

- Δ_{top}: Laplacian describing topological connectivity (Spin/Charges).
- $\mathcal{S}_{\partial}$: Boundary Entropy Term (Gravity/Forces).
- λ: Coupling constant derived from geometry (Fine Structure).

2. THE FATAL PREDICTION

The Standard Model and standard CSL models predict a **smooth** transition from quantum to classical behavior. Tamesis predicts a **Topological Step**.

> **THE TAMESIS CLIFF**
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> Interference Visibility (V) vs Mass (M):
>
> - $M < M_c$: $V \approx 1$ (Quantum)
> - $M = M_c$: $V \to 0$ **instantly** (within $\Delta M < 1\%$).
> - $M > M_c$: $V = 0$ (Classical)
>
> *Result: An abrupt "step" function, not a decaying exponential.* ***Unlike CSL or GRW, this transition is non-stochastic and spectrally gapped.***

3. PROPOSED EXPERIMENT

We propose a **Levitated Nanoparticle Interferometry** setup to verify this step. The experiment does not require high-energy colliders, only precise mass control in the mesoscopic

range. Crucially, it does not require continuous resolution of the decay curve; only the detection of the **sudden absence** of fringes.

PARAMETER	VALUE
Method	Talbot-Lau Interferometry with Silicon nanospheres
Target Mass Sweep	10^{-15} kg to 10^{-13} kg
Critical Value (M_c)	$\approx 2.2 \times 10^{-14}$ kg
Observation Target	Detect "Step" in visibility contrast

4. DEATH CRITERIA (FALSIFICATION)

The theory is rigid. It cannot be adjusted. It must be declared **FALSE** if any of the following are observed:

- ✗ **SMOOTH DECAY:** If the interference visibility decays smoothly ($e^{-t/\tau}$) instead of a step function, the topological phase argument is invalid.
- ✗ **SUPERLUMINAL SIGNALING:** If the collapse allows FTL communication (violation of No-Signaling), the holographic screening is flawed.
- ✗ **NULL GAP:** If no critical mass M_c is found up to Planck mass, the axiom of finite information is false.

5. PROJECT DATA STRUCTURE (ZENODO ARCHIVE)

This document accompanies the full research archive, organized into three stages:

STAGE	CONTENTS	LINK
01_Foundation_ToE	The Holographic Framework and Scientific Engines.	-
02_Research_Limits	M_c derivation and Limits.	-
03_System_Closure	Axiomatic Reduction, Spectral Operator, and Death Criteria.	-

"Where exactly will this fail?" — The beginning of Real Physics.