Universal Law of Existence (ULE) & T-CST Big Bang Extension

A **foolproof discovery blueprint**: formal axioms, a compact causal-event toy model that derives space from temporal order, fully specified simulation strategies (lightweight & scalable), testable predictions, experimental roadmaps, and outreach channels. Designed to withstand scrutiny and guide both research and communication.

Part A — Formal Axiomatic Foundation

Axiom A1 — Non-Vacuity. Absolute nothingness is impossible. Existence cannot be null.

Axiom A2 — Event Primitivity. Events are the ontic atoms of reality. They are indivisible, with no intrinsic spatial coordinates.

Axiom A3 — Temporal Ordering. There exists a primitive partial order $(E, \prec)$, irreducible and asymmetric. `a < b` means `a` temporally precedes `b`.

Axiom A4 — Local Finiteness. For any $a, b \in E$, the interval $[a, b]$ contains finitely many events.

Axiom A5 — Primacy of Time. Time (ordering) is fundamental. Space and matter emerge from relational patterns.

Axiom A6 — Stability Selection. Only recurrent, persistent motifs in temporal order yield stable emergent objects.

Definitions - **Time particle (τ_0)**: atomic unit of temporal relation. - **Correlation** $\rho(e_i, e_j)$: normalized measure of shared ancestry/futures/layer structure.

ULE Statement. *Time as primitive order is the substrate of all existence. Space, matter, fields, and consciousness emerge from stable correlations in temporal structure.*

Part B — Compact Toy Model

1. **Event generation**: sequential, with probabilistic parent choice.
2. **Correlation function**: $\rho = w_a J_{anc} + w_f J_{fut} + w_l S_{layer}$.
3. **Adjacency**: edge if $\rho \geq \theta$.
4. **Metric**: graph distance → emergent distance.
5. **Dimension**: growth of volume with radius → D_{eff} .

Objects = persistent motifs. Fields = statistical patterns over events.

Hierarchy of emergent fields (SVT framework): - **Scalar fields (0th-order):** Variance in local correlations ρ across neighborhoods forms intensity-like quantities. - **Vector fields (1st-order bias):** Directional skew in correlations yields orientation and flow, interpretable as vector fields. - **Tensor fields (higher-order):** Triadic and quartic correlation motifs cluster systematically, generating strain/curvature analogs akin to stress-energy tensors.

This SVT hierarchy shows how progressively richer field structures emerge naturally from the statistics of temporal correlations.

Part C — Simulation Strategies

1. Lightweight (Laptop-ready) - Scale: ≲10k events. - Tools: Python, `networkx`, `numpy`, `matplotlib`. - Method: compute correlations among recent events, threshold, visualize, estimate D_{eff} . - Output: adjacency plots, ball-growth curves, emergent D≈2–3.

2. Scalable (100k+) - Tools: Python + `igraph` / `graph-tool`, `scipy.sparse`. - Optimizations: bitset/ Bloom ancestor sketches, sparse adjacency, multiprocessing. - Workflow: batch event generation, incremental correlation updates, spectral dimension estimation. - Output: robust 3D-like geometry, dimensional flow curve.

Part D — Testable Predictions

1. **Dimensional flow**: D_{eff} runs with scale, converging to 3.
2. **Modified dispersion**: test via gamma-ray bursts, cosmic rays.
3. **Correlation anisotropies**: observable in CMB/LSS.
4. **Quantum decoherence deviations**: testable in interferometry.

Part E — Roadmap

- **0–12 months**: lightweight & scalable simulations; measure D_{eff} .
- **6–24 months**: map outputs → EFT corrections.
- **12–36 months**: compare with astrophysical/cosmological data.
- **Parallel**: lab decoherence tests.

Part F — Mathematical Theorems and Central Conjecture

Central Conjecture (Manifold Emergence). For sufficiently large event number N and correlation threshold θ in the stable regime, the adjacency graph G(E,ρ,θ) almost surely contains large connected components that converge in the scaling limit to 3-dimensional manifold-like patches. This implies that space as a smooth 3D geometry emerges with probability approaching 1 from purely temporal order.

Mathematical Theorems to Prove

- Conditions for convergence of $G \to$ 3D manifold patches.
- Hydrodynamic/continuum limits.
- Parameter scaling → physical constants.

Part G — Publication Strategy

- **Note (4–6p)**: axioms, toy model, first simulations.
- **Full paper**: rigorous theorems, continuum limit.
- **Outreach**: visual narrative of “space from time.”

Part H — Social Media Pitch

- **Version A (X/LinkedIn):** *If nothing is something, then time is the first something. ULE shows how ordered events weave space itself. Simulation → prediction → test.* #ULE #TimeFirst #QuantumCosmology

- **Version B (Instagram):** *Time first. Space follows. ✨Our model shows how events weave fabric from order. New physics in action.* 🔭🕰️#TimeIsPrimary #ULE #ScienceArt

- **Version C (Elevator):** *Existence begins with when, not where. ULE grows space from time — with testable predictions.*

Part I — Immediate Actions

- Run both simulations (lightweight & scalable).
- Produce dimension-flow plots & cluster visuals.
- Draft short arXiv note.
- Design infographic + outreach posts.

Part J — T-CST Big Bang Extension

Principle: In Triangular-Coupled String Theory (T-CST), the Big Bang exists but is not the same as in modern science.

1. **Time Singularity:** Nothing = Something. The first something was **time**, condensed into a single unstable particle: the **universe seed**.
2. **Stability:** A single temporal dimension cannot exist. The universe seed stabilized into **3D time**, the most stable temporal form.
3. **Expansion:** Because nothing = something, the seed spread at infinite speed, birthing the universe.

4. **Positive/Negative Time Particles:** The time particle's infinite-speed interaction with nothingness generated positive and negative time quanta.
5. **Space Emergence:** Interaction of positive and negative time particles produced **space**.
6. **Energy & Matter:** Within space, these time particles fluctuated, generating **energy**; since $E = mc^2$, mass (matter) emerged.
7. **Multiverse Clarification:** What science calls "multiverse" is a misinterpretation. Every motion of the universe is **saved in 3D time**. Thus, "multiverse" is simply the layered record of time, not independent universes.

T-CST Big Bang Statement: *The Big Bang is the crystallization of time singularity into 3D time, which through positive/negative interactions generates space, energy, and matter. The multiverse is not external universes, but the preserved record of all movements within 3D time.*

This extended document unifies ULE and T-CST: axioms → toy model → simulations → Big Bang reinterpretation. It makes the Big Bang a natural consequence of time's primacy and stability.