Chapter 1

The Universal Cycle: Compression, Expansion, Repeat

"The universe is not a single breath and then still, but a cycle of breathing."

Spacetime Compacity Theory (SCT) describes the universe not as a linear event, but as a natural cycle — a respiratory like system of compression and expansion.

This chapter presents the full cycle:

- Compression to overpressure ignition (Big Bang)
- Expansion and decompression
- Equilibrium point of balance
- Contraction back to maximum compacity
- Reignition Big Bang 2.0

1.1 Phase 1: Initial Compression and Big Bang Ignition

At the genesis of the universe, compacity reached maximum pressure. Velocity was capped at V = c, and spacetime could no longer compress further.

We express the initial overpressure as:

$$P_{\text{initial}} = C_{\text{max}} \tag{1.1}$$

With energy density at Planck levels, the field reached instability, and the natural result was decompression — the event known as the Big Bang.

1.2 Phase 2: Expansion and Decompression

As spacetime decompresses, energy density and compacity reduce over time. The expansion rate follows an exponential decay model:

$$\frac{dC}{dt} = -k \cdot C(t) \tag{1.2}$$

Solving:

$$C(t) = C_0 \cdot e^{-kt} \tag{1.3}$$

Where:

- C_0 is initial compacity
- k is the decompression rate constant

Using the Hubble constant as an estimator:

$$H_0 \approx 70 \,\mathrm{km/s/Mpc}$$
 (1.4)

$$k \approx H_0 \approx 2.27 \times 10^{-18} \,\mathrm{s}^{-1}$$
 (1.5)

1.3 Phase 3: Equilibrium Point — Balance of Field Tension

Equilibrium occurs when compacity equals the external field environment:

$$C(t_{\rm eq}) = C_{\rm external} \tag{1.6}$$

Estimating:

$$C_0 \approx 5.155 \times 10^{96} \,\mathrm{kg/m}^3$$
 (Planck density) (1.7)

$$C_{\text{external}} \approx 9.9 \times 10^{-27} \, \text{kg/m}^3 \tag{1.8}$$

$$\frac{C_0}{C_{\text{external}}} \approx 5.21 \times 10^{122} \tag{1.9}$$

Solving:

$$t_{\rm eq} = \frac{1}{k} \ln \left(\frac{C_0}{C_{\rm external}} \right) \tag{1.10}$$

$$t_{\rm eq} \approx \frac{1}{2.27 \times 10^{-18}} \times 283.37$$
 (1.11)

$$t_{\rm eq} \approx 1.249 \times 10^{20} \,\mathrm{s}$$
 (1.12)

$$t_{\rm eq} \approx 4 \times 10^{12} \, {\rm years}$$
 (1.13)

Conclusion: The universe is predicted to reach equilibrium approximately **4 trillion years** after the initial Big Bang.

1.4 Phase 4: Contraction — Return to Compression

Assuming symmetry in field dynamics, the contraction phase duration mirrors the expansion phase:

$$t_{\text{contraction}} \approx t_{\text{expansion}} \approx 4 \times 10^{12} \,\text{years}$$
 (1.14)

As the field relaxes, compacity rebuilds. The universe contracts naturally, driven by internal field tension.

1.5 Phase 5: Big Bang 2.0 — Re-ignition - A.K.A. Big Beat

The final return to maximum compacity triggers the next ignition:

$$t_{\text{BigBang 2.0}} = t_{\text{eq}} + t_{\text{contraction}} \tag{1.15}$$

$$t_{\text{BigBang 2.0}} \approx 8 \times 10^{12} \text{ years}$$
 (1.16)

Cycle Summary:

- Expansion: ~ 4 trillion years
- Contraction: ~ 4 trillion years
- Total cycle: ~ 8 trillion years



1.6 Concluding Postulation

The universe is not an isolated event, nor an endless expansion. It is a breathing system, governed by cycles of compacity. What began in compression, expanded in decompression, and will inevitably return — not as collapse, but as natural contraction toward renewal. Thus, Spacetime Compacity Theory predicts not only the origin of the universe, but its possible future and its returning in an eternal cycle. Who will inhabit the next one?

1.7 Breathing Universe

As previously explored in the universal cycle, the spacetime field undergoes a sequence of compression, ignition, expansion, equilibrium, and contraction. That description outlined how spacetime compacity evolves mathematically, but the deeper insight lies in what this pattern reveals: **the universe breathes**.

This is not heat death. This is not endless entropy. This is not collapse. It is rhythm. Spacetime moves not toward dissipation, but toward re-balance — toward renewal.

In this model, entropy is local and temporary, a side effect of differential compacity. What emerges over the grand scale is not disorder, but structure. The entire cosmic field functions as a closed, compressible system where pressure builds, releases, and restores. The return to high compacity is not decay, but preparation.

We have reached a conclusion that reverses the long-standing thermodynamic narrative: the universe is not winding down — it is winding back. Its deepest tendency is not to fragment, but to reassemble. This is negentropy not as a technical quirk, but as a cosmic law.

The compacity cycle does not merely describe motion. It describes intent — not in the anthropomorphic sense, but in the structural sense. Spacetime does not drift. It returns. What it releases, it reclaims. What it expands, it balances.

This is not mythology. This is not mysticism. This is a geometric, energetic, and causal framework. And its conclusion is plain: *existence is iterative*.

We have lived in a universe that expands. We are approaching a universe that balances. And beyond it, we envision the convergence — the return to maximal compacity and the re-ignition of what we now perhaps name not the Big Bang, but the **Big Beat**.

The pattern seems evident. The signs might be embedded in the structure of spacetime itself