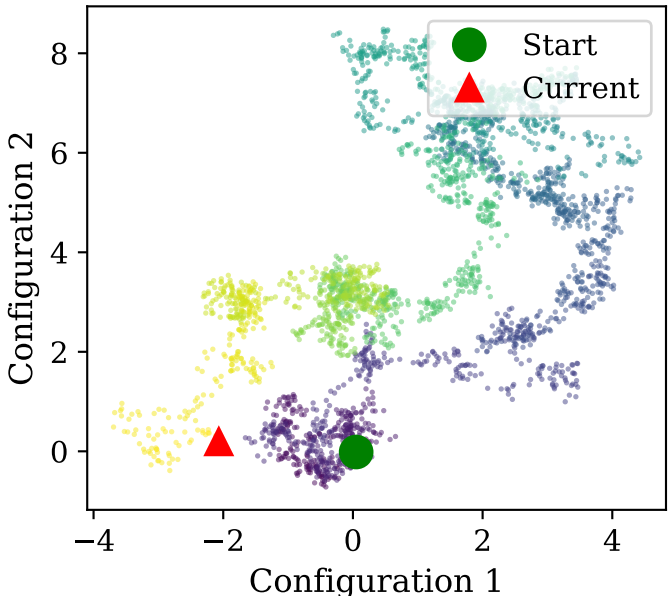
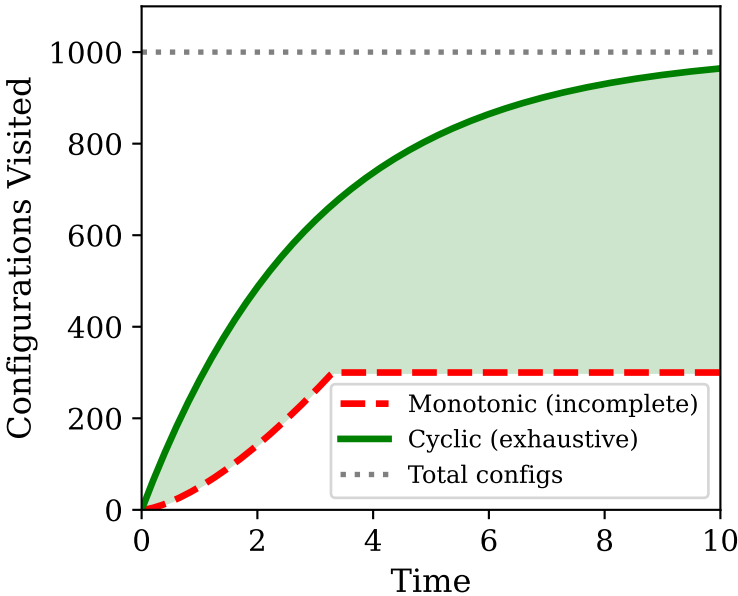


Figure 6: Categorical Exhaustion → Cyclic Cosmology

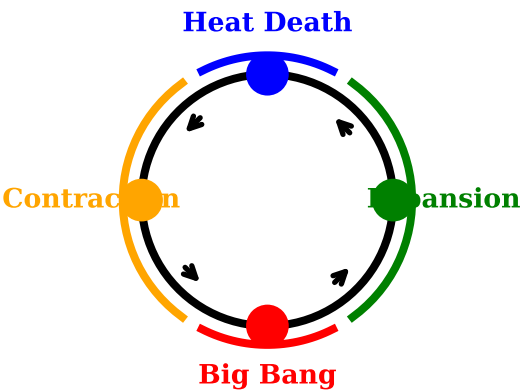
A. Configuration Exploration
(Visiting States)



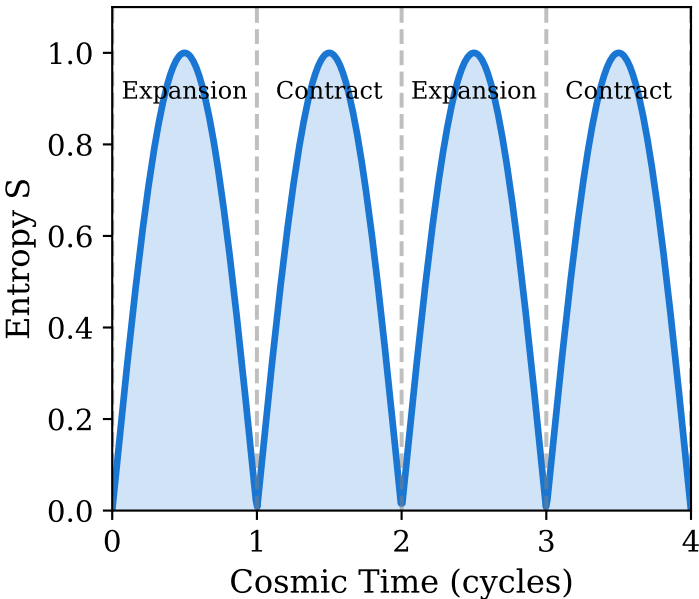
B. Exploration Comparison
(Cyclic Required)



C. The Cosmic Cycle
(Categorical Exhaustion)



D. Entropy is Cyclic
(Not Monotonic)



E. Heat Death is Incomplete

WHY HEAT DEATH ≠ END

Heat death = maximum entropy
= maximum degeneracy

But maximum degeneracy means:

- Only HIGH-entropy states visited
- LOW-entropy states never explored (stars, galaxies, life...)

—————

Categorical completeness
requires ALL states visited.

→ Contraction phase explores
low-entropy configurations.

F. Cyclic Universe Derived

DERIVED RESULT

The universe MUST be cyclic.

This is not assumption—
it follows from:

1. Bounded phase space (Poincaré recurrence)
2. Categorical completeness (all states must be visited)
3. Consistency requirements (no state left unexplored)

—————

Big Bang → Heat Death →
Big Crunch → Big Bang →...