

# **The Theory of Civilization's Autonomous Symbiotic Breakthrough Under the Matter-Energy Evolution of the Three-Dimensional Universe: A Scientific Model Based on Cosmic Time Scales**

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## **Abstract**

This paper proposes a scientific model titled "The Theory of Civilization's Independent Symbiotic Breakthrough Under the Evolution of Matter and Energy in the Three-Dimensional Universe". The fundamental premise of this model is that the three-dimensional universe is a pure matter-energy system without will or moral inclination. Based on the observational fact that the universe has nurtured intelligent civilizations during its 13.8-billion-year evolution, this theory argues that "time scale" is the ultimate catalyst for the realization of low-probability events. The model points out that if human civilization can suppress internal consumption through "ethical correction" (a systematic adjustment of social norms to suppress internal consumption and ensure long-term survival) to ensure long-term survival, it can transform the universe's long-term future into a deterministic resource for achieving the breakthrough of heat death. By constructing a dynamic model encompassing three dimensions—cosmic substrate, civilizational evolution, and cosmic game theory—this paper demonstrates that "breaking through heat death" is an inevitable outcome of the civilization's sustained development along the correct path, providing humanity with a highly deterministic future development framework based on scientific laws.

**Keywords:** Three-dimensional universe; Civilizational evolution; Heat death breakthrough; Time scale; Cosmic miracle; Symbiotic network; Scientific model

## **1. Introduction**

The heat death theory, as the ultimate deduction of the second law of thermodynamics

(law of entropy increase) in the universe, has long been regarded as the ultimate fate of all cosmic civilizations [1]. However, most existing theories either treat civilizations as passive observers or fall into unprovable assumptions such as "extraterrestrial intervention" and "higher-dimensional empowerment", lacking a scientific action program anchored in the autonomy of civilizations and the core laws of the universe.

More critically, these theories overlook a fundamental cosmological piece of evidence: over a time span of 13.8 billion years, the universe has successfully accomplished a "miracle"—the transformation from singular chaos to intelligent civilization [2, 3]. This fact proves that the universe itself is the greatest "miracle catalyst"—the length of time is sufficient to convert the extremely low-probability process of "disorder to order" into an inevitability.

To fill this gap, the core argument of the theoretical model constructed in this paper is as follows: Since the universe has proven its ability to create miracles over billions of years, as long as a civilization can ensure its own survival over a sufficiently long time scale and follow the correct evolutionary path, breaking through heat death will become a highly deterministic possible event in the long-term future. This model aims to provide human civilization with a future framework that is based on the objective laws of the universe, embodies scientific rigor and strategic inevitability, emancipates the ultimate destiny of civilization from "deterministic pessimism" and "visionary optimism", and anchors it in the core logic of "time creating inevitability".

## 2. Core Scientific Model: A Three-Dimensional Dynamic Model Based on Time Scales

The core of this model consists of three interrelated and dynamically balanced dimensions. The ultimate goal of their logical closed loop is to explain how civilizations transform the universe's "time resources" into the "inevitability of breaking through heat death". All three dimensions take "time scale" as the underlying logic, progressing layer by layer and supporting each other to form a complete scientific deduction system.

### 2.1 Cosmic Substrate Dimension: The Stage of Time (Objective Premise for the Birth

of Miracles)

The essence of the three-dimensional universe is an unconscious stage where matter and energy evolve in accordance with objective laws such as the law of entropy increase and the law of conservation of matter [4]. Its most core and irreplaceable resource is not matter or energy, but the long time scale— the aggregation of matter, the circulation of energy, and the emergence of order all require time as a carrier to be realized.

The 13.8-billion-year evolutionary history of the universe itself is the ultimate evidence of "time creating miracles": from the disorderly diffusion of matter after the singularity explosion, to the ejection of heavy elements by supernovae to build the material foundation of life, and then to the formation of planets in the habitable zone and the evolution of life from single-celled organisms to intelligent civilizations—each step is a "low-probability event", but with the support of billions of years, it is ultimately transformed into an "inevitable miracle". This process confirms the core logic of this dimension: the time scale of the universe is the ultimate premise for the emergence of all order and all miracles.

Key Variables:

Degree of matter aggregation (the complete cycle from heavy element ejection by supernovae to planet formation, time scale: hundreds of millions of years)

Energy circulation efficiency (the transfer efficiency of stellar radiant energy to support planetary life, time scale: tens of millions to hundreds of millions of years)

Remaining cosmic time scale available for civilizational evolution (the time window for the universe to naturally move towards heat death, magnitude: hundreds of billions to trillions of years, providing sufficient potential time reserves for civilizations to break through heat death)

Evolutionary Stages:

Germination Stage: From singularity explosion to matter diffusion to heavy element formation, taking approximately 10 billion years to lay the material foundation for the birth of miracles.

Evolutionary Stage: From the formation of planets in the habitable zone to the birth of

life to the rise of civilizations, the Earth case took approximately 3.8 billion years to complete the first cosmic miracle.

End Stage: Civilizational intervention will replace the unconscious evolution of matter and energy and become the dominant force determining the ultimate direction of the universe, with a time scale of more than 100 billion years—providing a stage for the second miracle, the breakthrough of heat death.

## 2.2 Civilizational Evolution Dimension: The User of Time (Core Carrier for Inheriting and Replicating Miracles)

Civilization is an "accidental yet inevitable miracle" created by the universe using its own time. Its core mission is not to passively adapt to the universe, but to inherit the universe's "time heritage" and become an active user of time—every moment of a civilization's continuation is an accumulation of its ability to utilize time resources; every advancement of a civilization is a transformation of time into the power of order and technology.

The core contradiction of this dimension is the "waste and efficient utilization of time": internal consumption (manifested as internal conflicts, resource competition, and structural inefficiency) is the ultimate waste of time resources—when a civilization consumes its resources and energy on self-confrontation, it essentially interrupts its own evolutionary cycle and prematurely loses its qualification to utilize time resources. In contrast, ethical correction and technological development represent the efficient utilization of time resources: the ethical consensus of "compassionate symbiosis" (defined as a rational behavioral standard defined and practiced by human intelligence to ensure the survival of its own civilization) essentially suppresses internal consumption and ensures the long-term survival of the civilization, thereby gaining the qualification to "continuously utilize the universe's time resources". The core value of technological iteration is to improve the "time conversion efficiency", transforming long periods of time into the ability to achieve technological breakthroughs and resource control.

Scientific Definition of "Ethical Correction" and "Compassionate Symbiosis":

"Ethical correction" in this theory specifically refers to the systematic process by

which a civilization proactively adjusts its internal social norms, value orientations, and resource allocation principles based on a rational understanding of survival risks. Its sole purpose and ultimate criterion is to increase the probability of the civilization's long-term survival.

**Fundamental Driving Force:** It does not originate from obedience to supernatural will or adherence to abstract moral laws, but from the fundamental need of a civilization to maintain its own existence, representing a direct response of intelligence to the highest proposition of "survival".

**Core Mechanism of Action:** By establishing rules oriented towards "symbiosis", it directly reduces the "internal consumption coefficient" and redirects resources wasted due to internal conflicts towards technological iteration and risk response.

**Essence:** Therefore, "ethical correction" is not a flexible moral exhortation, but a set of rigid survival algorithm optimizations based on rational calculation.

Similarly, "compassionate symbiosis" does not originate from any religious doctrine or spiritual inspiration; it is essentially a "rational behavioral standard defined and practiced by human intelligence to ensure the survival of its own civilization". It is the highest-level rational criterion for long-term survival that a civilization, through its wisdom, reviews countless cycles of rise and fall, and proactively defines, selects, and defends during its long evolution. Thus, "compassionate symbiosis" is a survival strategy self-defined under the guidance of intelligence, and a qualification certification that a civilization must obtain to gain the "right to use cosmic time".

**Key Variables:**

Sustainable duration of civilization (directly determined by the internal consumption coefficient and the degree of ethical consensus, and is a prerequisite for a civilization to utilize time resources)

Rate of technological iteration (determines the efficiency with which a civilization converts time into technological advantages)

**Evolutionary Stages:**

**Germination Stage:** Civilization relies on material survival, survival competition is prominent, internal consumption is severe, time utilization efficiency is low, and time

resources are largely wasted.

Critical Stage: Civilization establishes the core model of "compassionate symbiosis", effectively suppresses internal consumption through ethical correction, ensures its own long-term survival, thereby obtaining the qualification certification of "the right to use cosmic time", and begins to systematically accumulate technology and efficiently utilize time resources.

Advanced Stage: Civilization enters a long cycle of stable survival. With the support of nearly infinite time resources, technological iteration breaks through all technical bottlenecks, and it will inevitably achieve global control over cosmic matter and energy, gaining the ability to replicate cosmic miracles and break through heat death.

### 2.3 Cosmic Game Theory Dimension: The Filter of Time (Risk Barrier for the Continuation of Miracles)

On a cosmic scale, time itself is the most fair and strict filter (a cosmic mechanism that eliminates unsustainable civilizations over long periods)—it does not favor any civilization, but only selects civilizations that "know how to survive continuously and utilize time efficiently". Any civilization that cannot suppress internal consumption and achieve long-term sustainability, regardless of its temporary technological strength, will be eliminated over the long course of time; those that ultimately survive and meet must be civilizations that have also comprehended the "path of long-term survival" and passed the time filter.

The core logic of this dimension is that "time strategy takes precedence over technological strategy": based on the "risk of extraterrestrial civilization contact" warned by the scientific community (i.e., advanced civilizations may colonize or threaten less advanced civilizations for resources), this is essentially a "short-term risk in the immature stage of civilization". When a civilization has not yet achieved self-stability through ethical correction and has not accumulated sufficient strength over time, exposing its existence prematurely will face the risk of destruction by more advanced civilizations—essentially a "failure of time strategy" (failing to strive for sufficient evolutionary time for itself). "Low-key development" is not a passive withdrawal from the world, but a rational time strategy for a civilization in its

immature stage—its core goal is to avoid early risks, ensure that it can enter the "time track of long-term evolution", and accumulate strength through the time filter.

Key Variables:

Generational gap in civilizational sustainability (a more fundamental gap than the technological generational gap)

Exposure degree (premature exposure when strength is insufficient is a fatal waste of time resources)

Evolutionary Stages:

Dormant Stage: Civilization develops in a low-key manner to avoid the risk of early exposure. Its core goal is to "survive and endure", ensuring that it can enter the long-term time track and accumulate strength through the time filter.

Game Stage: The time filter begins to play its role. Unsustainable civilizations are eliminated due to uncontrolled internal consumption or strategic mistakes, while sustainable civilizations continue to accumulate strength and gradually narrow the technological gap.

Dominant Stage: Civilizations that have passed the time filter naturally grow stronger during long-term evolution, and their technological strength tends to be equal. At this point, "compassionate symbiosis" becomes the only rational choice—no mandatory transmission or strength suppression is required; instead, it is a consensus formed by civilizations after the time filter, naturally constructing a global symbiotic network and jointly utilizing time resources to promote the breakthrough of heat death.

### 3. Theoretical Framework: From Temporal Inevitability to Heat Death Breakthrough

This theoretical framework takes "time creating miracles" as its first principle, progressing layer by layer with a closed logical loop. Starting from the objective laws of the universe, it deduces the evolutionary path of civilizations and ultimately focuses on the "inevitability of breaking through heat death".

#### 3.1 First Layer: Cosmic Substrate Theory (Time Creating Miracles—Scientific Cornerstone of the Theory)

Core Argument: The 13.8-billion-year evolutionary history of the universe is an observed and confirmed "miracle" of nurturing high-level order from disorder. This

fact is not accidental, but an inevitable result of the time scale—over a sufficiently long period, the probability of any low-probability "disorder-to-order" event will approach 1. The birth of human civilization is not an "accidental gift" from the universe, but an inevitable manifestation of the cosmic matter-energy system during its long evolution.

Scientific Support: Big Bang cosmic model, observational verification of the age of the universe (13.8 billion years) [2], theory of stellar evolution and heavy element synthesis [3], evolutionary laws of life systems as local low-entropy entities [5].

### 3.2 Second Layer: Core Theory of Civilizational Evolution (Inheriting the Time Heritage—The Survival Path of Civilizations)

Core Argument 1: Every moment of a civilization's continuation is an inheritance and utilization of the universe's "time heritage". The 100-billion-year time window endowed by the universe is a "deterministic resource" for civilizations to break through heat death—as long as a civilization can continue to survive, it can continuously utilize this heritage.

Core Argument 2: "Ethical correction" (practicing compassionate symbiosis) is the only scientific strategy for a civilization to obtain the "right to use cosmic time". It is not a moral lecture, but a "survival qualification certification" for civilizations—only by suppressing internal consumption through ethical correction can a civilization ensure that it can continuously utilize time resources.

Scientific Support: Theory of "cooperative evolution" in evolutionary biology [6], cases of "civilizational extinction caused by internal consumption" in human history [7], "stability first" principle in the evolution of complex systems.

### 3.3 Third Layer: Cosmic Game Theory (Time Filter—Ultimate Logic of the Game)

Core Argument 1: The "risk of extraterrestrial civilization contact" is a short-term risk in the immature stage of a civilization. In the long run, the universe's "time filter" will eliminate all civilizations that have a tendency towards self-destruction and cannot achieve long-term sustainability.

Core Argument 2: Low-key development is a rational time strategy for a civilization in its immature stage, and compassionate symbiosis is an inevitable consensus of

civilizations after passing the time filter. When a civilization passes its immature stage, "mutual destruction" will become the most irrational choice.

Scientific Support: "Time filter" interpretation of the Fermi paradox [8], "long-term interest first" principle in the game of complex systems.

### 3.4 Fourth Layer: Ultimate Theory of Heat Death Breakthrough (The Fruit of Time—Inevitability of the Ultimate Goal)

Core Argument 1: Breaking through heat death is the technological endpoint that a civilization is likely to reach based on known physical laws after ensuring its own infinite continuation and with the support of nearly infinite time resources. This is not an optimistic conjecture, but a rigorous scientific inference based on the fact that "the universe has proven its ability to create miracles over 13.8 billion years".

Core Argument 2: The essence of the dual outcomes is the "result of time filtering":

Positive Outcome (High Certainty): Civilizations that successfully pass the time filter will, after long-term development, be highly likely to achieve a breakthrough in heat death.

Negative Outcome (Accidental): A civilization's self-destruction due to internal consumption only means that it failed to pass the universe's time filter, which does not affect the high probability of breakthrough for those that passed the filter.

Scientific Support: "Locally reversible" property of the law of entropy increase [1], scientific deduction of the concept of stellar system-scale energy utilization based on technologies such as nuclear fusion and space solar power stations, "emergence" theory of complex systems [9].

## 4. Theoretical Foundation and Scientific Rigor

### 4.1 Cosmological Foundation (Support from First Principles)

Core Support: Big Bang cosmic model, observational verification of the age of the universe, theory of stellar evolution and heavy element synthesis.

### 4.2 Logical and Probabilistic Foundation (Support from Core Logic)

Core Support: The idea of the "infinite monkey theorem" in probability theory, closed logical deduction.

### 4.3 Foundation of Systems Science and Evolutionary Biology (Support from

Deduction Process)

Core Support: Evolution and emergence theory of complex systems, cooperative evolution theory, research on civilizational sociology.

The core avoidance of this theory is to resolutely abandon all unprovable sci-fi settings, and all inferences are based on the scientific boundaries of "three-dimensional universe + matter/energy civilization + human independent evolution".

## 5. Conclusions and Prospects

The revolutionary nature of the theory proposed in this paper lies in transforming "breaking through heat death" from a philosophical proposition full of uncertainty into a highly deterministic scientific inference based on the objective historical laws of the universe.

The core conclusion of this theory is: Time is the greatest miracle of the universe and the ultimate key for civilizations to break through their destiny. Human civilization does not need to wait for any external salvation; all we need to do is, through wisdom and self-discipline, ensure that our own civilization can continue to exist in this great torrent of time. Once this is achieved, breaking through heat death will be a destiny that our civilization is highly likely to realize.

Future research will focus on:

Modeling and quantitative analysis of the "sustainable duration of civilizations".

In-depth exploration of the social and technological structures that ensure the stability of ethical consensus.

Continuously using cosmic history as a mirror, tracking the latest progress in astrobiology, and verifying and revising the theory.

We firmly believe that with this model as a guide, human civilization will be able to move towards the sea of stars that is highly likely to belong to us with unprecedented confidence and determination.

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