



Unified Complex Systems Theory (UCST): Resolving Materialist Dilemmas Through Dualist Ontology and Active Force

Weicheng Cui

Zhejiang Engineering Research Center of Micro/Nano-Photonic/Electronic System Integration, Hangzhou, Zhejiang 310030, China and Department of Electronic and Information Engineering, School of Engineering, Westlake University, Hangzhou, Zhejiang 310030, China

Rong Li

Zhejiang Engineering Research Center of Micro/Nano-Photonic/Electronic System Integration, Hangzhou, Zhejiang 310030, China and Department of Electronic and Information Engineering, School of Engineering, Westlake University, Hangzhou, Zhejiang 310030, China

Lingli Pan

Zhejiang Engineering Research Center of Micro/Nano-Photonic/Electronic System Integration, Hangzhou, Zhejiang 310030, China and Department of Electronic and Information Engineering, School of Engineering, Westlake University, Hangzhou, Zhejiang 310030, China

ABSTRACT

The fragmentation of complex system theories, contradictions in foundational physics, and the inability of materialist science to explain the consciousness phenomena of the living agency in a complex system have long hindered interdisciplinary progress. This study presents the Unified Complex Systems Theory (UCST), a novel framework addressing these gaps by generalizing classical mechanics, establishing a dualist mind-body ontology, and introducing active force into mechanics. Rooted in 33 core axioms, UCST clarifies ambiguous fundamental concepts (e.g., universe/world, mass, vacuum), axioms and unifies micro-macro and non-living-living systems under a single dynamical equation integrating passive (physical) and active (mind-derived) forces. We demonstrate UCST's ability to resolve intractable materialist problems—including the mind-body dilemma, action-at-a-distance paradox, and altruism's ethical foundation—and validate its predictions via testable experiments (e.g., active force measurement, aether detection). By bridging science, ethics, and spirituality, UCST advances a postmaterialist paradigm that expands the boundaries of scientific inquiry.

Keywords: Unified Complex Systems Theory, dualist ontology, active force, postmaterialist science, mind-body problem.

INTRODUCTION

Complex systems—spanning subatomic particles to cosmic structures—are central to modern science and engineering [1]. Yet the 2021 *Map of Complexity Sciences* [2] identifies at least 67 distinct, fragmented theories or sub-disciplines in the field, blending classical mechanics (CM),

quantum mechanics (QM), and relativity theory (RT) into a patchwork of contradictory frameworks [3]. For example, large-scale engineering projects or Earth's sustainability may be solved by multiple theories yielding different conclusions, leaving researchers without a reliable guide.

Foundational physics exacerbates this fragmentation. CM, QM, and RT embody irreconcilable philosophical paradigms: QM and RT adopt revolutionary redefinitions of spacetime, matter and energy, while conservative extensions of CM retain classical concepts without resolving inconsistencies [3]. Fundamental terms like "vacuum" (a "virtual particle sea" in QM vs. "empty space" in CM) and "mass" (quantity of matter in CM vs. mass-energy equivalence in RT) lack cross-theory consistency, crippling theoretical coherence.

Materialist science—rooted in monist philosophy that reduces all existence to matter—compounds these issues. It cannot explain living systems' active agency (e.g., free will, self-movement and information-related behaviour) or integrate non-material phenomena (e.g., consciousness) [4], as it only recognizes passive forces (gravity, electromagnetism, weak and strong force) [3]. This limits practical solutions to complex challenges like climate change, biological evolution, and social conflict, which demand unifying micro-macro and living-non-living dynamics.

The **Unified Complex Systems Theory (UCST)**—developed by Cui's group at Westlake University since 2019 [2, 5-31]—addresses these gaps. Unlike theories that reject CM, UCST generalizes it to accommodate living systems, clarifies foundational concepts, and establishes an axiomatic framework for cross-scale/domain unification. The milestone progress of UCST is summarized in Fig.1 and they are briefly described as follows.

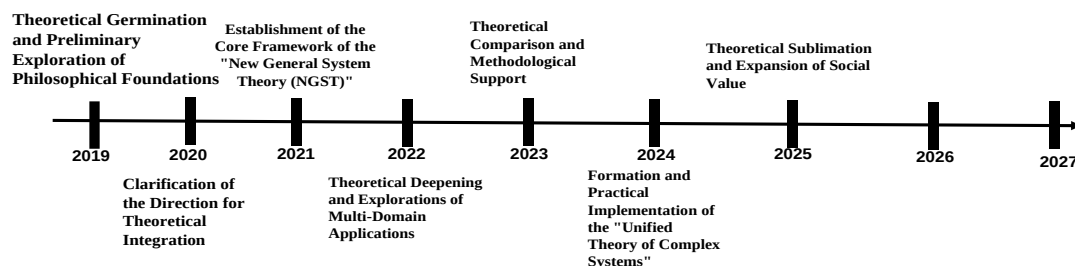


Fig 1: The milestone progress of UCST

2019: Theoretical Germination and Preliminary Exploration of Philosophical Foundations

This stage focused on preliminary explorations of cosmology, debates in fundamental physics, and system models, laying the groundwork for subsequent theoretical construction.

- Focus on **philosophical reflections on fundamental physics and cosmology**: Explored ideas for unifying the Einstein-Bohr controversy [5], constructed a logically consistent cosmological model based on Buddhist philosophy [6], and compared this model (Buddhist cosmological model, BCM) with the most widely accepted cosmological model (Big Bang cosmological model, BBCM) [7].
- Laid **early foundations for system theory**: Discussed approaches to establishing a

scientific cosmological model [8], proposed conservation laws for open systems based on BCM [9], and supplemented the philosophical underpinnings of the theory from the perspective of faith/belief [10]. In that paper [10], a life model of nine floors for a human being was proposed and in conjunction with David Hawkins' levels of consciousness theory [32], the number of floors one reaches can be measured quantitatively. This life model provides a practical and actionable method for guiding people to shift their focus from the pursuit of material wealth to the elevation of their spiritual realm.

2020: Clarification of the Direction for Theoretical Integration

The core development was integrating previous cosmological explorations with the "Theory of Everything," clarifying the core direction for theoretical integration. We proposed constructing a "Theory of Everything" based on the Buddhist Cosmological Model, the first attempt to directly link a specific cosmological view with the construction of an ultimate theory was made, laying the direction for the subsequent unification goal of system theory [11].

In that period, matter and energy are chosen as two fundamental existences. Later it was found that information is hard to be attributed to any of them. In that ontology, there exists two types of energy: energy as a property of matter and energy as an independent existence in parallel with matter like mass-energy conversion used by Einstein in his famous equation ($E=mc^2$) [33]. It is very difficult to establish relations between them, so we decided to make a change [13].

2021: Establishment of the Core Framework of the "New General System Theory (NGST)"

This was a pivotal year for the systematization of the theory, completing the systematic construction from philosophical ontology to core concepts and formally forming the basic framework of the "New General System Theory."

- Consolidated **the axiomatic and philosophical foundations of the theory:** Established the axiomatic basis for the "Theory of Everything (TOE)" [12] and it was found that people do not like the name TOE, so the theory is renamed as New General System Theory (NGST) in order to emphasize that NGST is the generalization of Bertalanffy's general system theory [34]. Later, we realized the Relativity of Simultaneity Axiom that concept A and the concept non-A should be co-defined at the same time. Thus, visible objects and invisible particles are a pair. We can divide visible objects into living and non-living objects and on the invisible side, there should also be two existences. It is inappropriate to use matter and energy as two fundamental existences, so we decided to use aether (the ensemble of invisible particles acting as the essence of non-living material objects) and minds (the non-matter existence acting as the essence of living material objects) as the new ontology of our NGST [13]. This is a big step forward and we move from monist materialism to dualism of aether and minds.
- Clarified **core concepts and models:** Defined the concept of "field" in the New General System Theory [14] and provided a comprehensive overview of mind-body models to offer cross-disciplinary references for the theory [15].
- Conducted **preliminary theoretical verification:** Re-examined the classic "two-body problem" using the new general system theory, verifying its explanatory power for traditional physical problems [16], especially the problem of the non-existence of inertial frames for human observers is explicitly pointed out.

2022: Theoretical Deepening and Explorations of Multi-Domain Applications

Building on the core framework, the scope of NGST was expanded to cover multiple fields such as thermodynamics, quantum physics, and kinematics.

- Reconstructed **concepts in fundamental physics and thermodynamics**: Re-examined core concepts including heat, work, energy, entropy, and information based on NGST [17].
- Verified **the practical and quantum compatibility of the theory**: Used NGST to predict the trajectory of a projectile, demonstrating its application value in classical motion problems, quantum particles and living objects [18]; explored the falsifiability of a proposition "it is indispensable to use complex numbers in the quantum theory", addressing debates in fundamental physics [19]. For orthodox quantum scientists they are always emphasizing that the microscopic worlds are very different from the macroscopic worlds and even the mathematical languages used to represent them must be different while in NGST we emphasize that there should be no jump in the scale but a jump will occur at the death of a living object.
- Extended **to astronomical and system observations**: Analyzed the impact of Earth's motion on lunar trajectory measurements, expanding the theoretical perspective to celestial systems [20].

2023: Theoretical Comparison and Methodological Support

Further consolidated the positioning and foundations of the New General System Theory through theoretical dialogue and methodological research.

- Strengthened **the philosophical positioning of the theory**: Systematically compared the philosophical view of the New General System Theory with the ideas of Einstein and Bohr, clarifying its theoretical boundaries and uniqueness [22].
- Consolidated **methodological foundations**: Studied the theoretical basis of the meta-synthesis method, providing methodological support for research on complex systems [21].

2024: Formation and Practical Implementation of the "Unified Theory of Complex Systems"

With the core goal of the "unified theory", phased achievements were made and deepened in specific application scenarios and fundamental scientific issues.

- Formally proposed **the goal and framework of the "Unified Complex Systems Theory (UCST)"**: Published the landmark paper *Toward a Unified Theory for Complex Systems*, clarifying the unification direction and core content of the theory [3]. The unification was carried out from fundamental concepts, fundamental assumptions and mathematical languages. The original contributions of this UCST include: (1) moving away from a revolution against classical mechanics and embracing its generalization, (2) offering a dualist approach to the mind-body problem instead of the monist solution of the past, and (3) introducing an active force for living objects in living state.
- Expanded **application scenarios of the theory**: Used the theory to analyze the "active force harnessing" mechanism of a child's swing, demonstrating its explanatory power for specific physical phenomena [23].
- Extended **to fundamental scientific and popular science explorations**: Discussed

whether science can reveal the origin of the Universe [24], and published the book *The Origin of Science* to popularize foundational scientific reflections related to the theory [30].

2025: Theoretical Sublimation and Expansion of Social Value

Integrated the UCST with philosophical sublimation and social issues, exploring the humanistic and practical value of the theory.

- Deepened **philosophical connotations**: Proposed a philosophical perspective of "transcending binary opposition," linking it to issues of harmonious coexistence of humanity, reflecting the humanistic extension of the theory [25, 26].
- Connected **multi-dimensional issues**: Integrated the relationships between science, philosophy, the Universe, and life from a system theory perspective [27], and used the unified theory to address the "top ten issues for humanity's future" [29].
- Explored **paths for social application**: Proposed the "Harmonious Ecological Village" scheme, integrating the theory with practical challenges such as labor force transformation and social development [28].

The purpose of this paper is to: (1) Present UCST's core fundamental hypotheses; (2) Demonstrate UCST's resolution of key problems intractable to materialist science; (3) Outline the logical steps of UCST's theoretical construction; (4) Detail testable predictions and experiments for validation of UCST; (5) Explain how UCST expands human knowledge and supports a postmaterialist paradigm.

FUNDAMENTAL AXIOMS OF UCST

UCST's framework rests on 33 interconnected axioms, organized into seven categories: general foundations, ontological positions, epistemological principles, core physical concept definitions, force/system dynamics, methodology, and revised classical mechanics theorems. A summary of key hypotheses is provided in Table 1. While most of these axioms have been published where the relevant references are given and some of them are new and recently discovered by us.

General Axioms

General axioms establish UCST's logical consistency and cognitive boundaries which should be valid for general scientific theories:

- **Infinite Universe and Finite World Axiom**: The *Universe* (humanity's largest imaginable system) is infinite in time/space (philosophical, unobservable); the *world* (humanity's largest observable system) is finite (scientific, testable) [12]. This avoids untestable speculation about cosmic origins such as the Big Bang theory and directs scientific interests to the origin of the finite world we can observe such as the origin of the Milky Way Galaxy.
- **Relativity of Simultaneity Axiom**: All existence is relative to complementary concepts (e.g., active/passive, matter/mind, materialism/idealism, theism/atheism), resolving binary oppositions like determinism vs. probabilism [13].
- **Five Core Scientific Axioms**: Affirm the objective existence of humans/the world (Existence), rule-governed causality (Causality), distance-dependent interactions

(Locality), human capacity to discover rules (Knowability), and predictive generalization of observations (Extrapolation) [30].

- **Consistency-Completeness Contradiction Axiom:** Theories cannot be both fully consistent and complete, requiring pragmatic trade-offs [30].

Ontological Axioms

UCST adopts a dualist model to unify living and non-living systems:

- **Dualist Mind-Body Ontology:** The mind (non-material) and body (material) are mutually exclusive and exhaustive of the sample space. The combination of mind and body formed a living agent, while the separation of mind and body causes death (transition to non-living) [13, 15]. It must be pointed out that in UCST, the mind is just one kind of the eight consciousnesses [13] and therefore, the meaning of mind in UCST is different from the conventional meaning used by others.
- **World Composition:** The observable world comprises visible objects (living/non-living) and invisible micro-particles (defined as *aether*). Living objects' essence is mind (self-movement capacity); non-living objects' essence is aether (minimal material particles for forming any visible material objects).
- **Object Hierarchy Axiom:** Life attributes are scale-dependent (e.g., a stone is non-living, but its atoms are living; a human being is a living object but in his body it may contain some dead cells).

Epistemological Axioms

These define the limits and nature of human cognition:

- **Verifiability Axiom:** Testable claims require finite time/space bounds [30].
- **Limited Capacity Axiom:** Human cognitive ability to the finite world is also limited [30].
- **Generalized Uncertainty Principle:** Clarifying one phenomenon transfers uncertainty to its complements [13].

Core Physical Concept Definitions

UCST resolves conceptual ambiguity by standardizing key terms:

- **Time and Space:** Kantian frameworks (mind-dependent reality constructs) with absolute space and relative time (contradicting RT's spacetime continuum) [13].
- **Mass:** A measure of matter quantity (invariant across coordinates); inertial, active gravitational, and passive gravitational mass are identical. Mass-energy equivalence is rejected—mass loss in nuclear reactions stems from aether particle emission and the lost mass in nuclear reactions equals to the mass of emitted aether particles [13].
- **Vacuum:** An imaginary empty space (non-existent in reality); the world is filled with mind, aether, and objects [13].
- **Field:** A descriptive tool (not independent entity) for force transmission via aether waves in the physical space; "psychic fields" mediate active force in living systems [14].

More fundamental concepts such as matter, consciousness, energy, heat, work, life, probability, information and entropy need to be clarified [2, 17].

Force and System Dynamics

UCST innovates force classification and system definitions:

- **Two Force Types:**
 - *Passive Force* (F_p): Attractive/repulsive (i.e., gravity, electromagnetism, weak and strong) forces between two material objects [3]. If we use a force vector [35], it can be represented as $F_p(B, C)$ while B is different from C.
 - *Active Force* (F_a): Generated by one living object via mind-body-support interaction (determined by free will) [3]. If we use a force vector, it can be represented as $F_p(B, B)$. For a non-living object, $F_p(B, B)$ is always zero because it lacks a mind.
- **System Classification:**
 - *Closed*: No matter exchange (allows energy/information transfer) [30].
 - *Isolated*: No matter/energy/information exchange (only the Universe qualifies) [30].
 - *Open*: Exchanges matter/energy/information; all living-containing systems are open [30].

Methodological Axioms

- **Determinism-Probabilism Unity:** System behavior depends on information availability (deterministic if parameters are known, probabilistic if not) [5].
- **Precision-Correctness Balance:** Greater precision increases information content but may reduce correctness [36].

Revised Classical Mechanics Theorems

UCST modifies classical theorems to include living systems (Table 2) and to give up the initial frame requirement. For example:

- **Newton’s First Law:** Inanimate objects follow passive force rules; living beings move autonomously via active force [12].
- **Second Law of Thermodynamics:** Entropy increases only in isolated non-living systems; living-containing open systems can reduce entropy via both active force and entropy transport [12].

Table 1: Core Axiom System of UCST

Axiom Category	Axiom No.	Axiom Name	Axiom Content
General Axioms (8)	1	Infinite Universe and Finite World Axiom	The Universe is defined as the largest system imaginable by humans, with infinite nature in both time and space. The world is the largest system observable by humans, with a finite nature in both time and space.
	2	Relativity of Simultaneity Axiom	There is no perspective-independent existence; all described existences are relative, as the concept of existence depends on other concepts, at least its opposite or complement.
	3	Axiom of Existence	When constructing a theory, the objective existence of humans and the observable world is presupposed.

	4	Axiom of Causality	The observed world operates according to rules, with every cause having corresponding effects and every effect having causes. No one to one is required.
	5	Axiom of Locality	The strength of interaction between two objects decays with increasing distance.
	6	Axiom of Knowability	Humans can reveal the operating rules of the observable world.
	7	Axiom of Extrapolation	Rules derived from current observations can predict the past and future to a certain extent.
	8	Consistency-Completeness Contradiction Axiom	A theory cannot satisfy both logical consistency and completeness simultaneously, and a scientific theory should stick to logical consistency.
Ontological Axioms (3)	9	Dualist Mind-Body Ontology	Mind and body are two totally different entities, while body is material so mind is non-material. When mind separates from the body, the living object dies and degenerates into a non-living object.
	10	Composition of the World	The observable world consists of visible objects (living/non-living) and invisible objects in the form of micro moving particles and the latter is called aether. Living objects have self-moving ability, while non-living objects do not. The essence of non-living objects is aether while the essence of living objects is mind. Both aether, minds, living objects and non-living objects fill all space in the world.
	11	Object Hierarchy Axiom	Objects can be divided into multiple levels from a scale point of view (e.g., a stone as a whole is an inanimate object, while its molecular/atomic levels are living objects).
Epistemological Axioms (3)	12	Verifiability Axiom	Verifiable system properties need to be limited to finite time and space.
	13	Limited Capacity Axiom	Humans cannot cognize the entire Universe, and their cognitive ability towards the world is also limited.
	14	Generalized Uncertainty Principle	Clarifying a thing requires attributing uncertainty to its complementary things. For example, our knowledge to a finite world is established by attributing the uncertainty to the infinite Universe.
Methodological Axioms (2)	15	Determinism and Probabilism	The nature of a system (deterministic or probabilistic) depends on the information grasped. If active force, resistance, and other parameters are fully known, the system is deterministic; if parameters are uncertain, it is probabilistic.

	16	Precision-Correctness Balance Axiom	Given information, the more precise a statement is, the higher its information content, but its correctness may decrease.
Hypotheses on Core Physical Concepts (4)	17	Time and Space	Adopting Kant's definition, time and space are the frameworks for the mind to construct reality experiences, similar to classical mechanics but absolute space, relative time and different from relativity's relativistic spacetime.
	18	Mass	Defined as a measure of the quantity of matter, obtained by comparison with a universally agreed standard. Inertial mass, active gravitational mass, and passive gravitational mass are considered identical and independent of the coordinate system. The mass-energy equivalence principle ($E=mc^2$) is rejected since both mass and energy are different properties of matter and they are not equivalent. By definition, mass is coordinate independent property while momentum and energy are coordinate dependent properties. All the micro particles have masses although we cannot measure some of the micro particles such as photons. Mass loss in phenomena like nuclear reactions is attributed to the emission of massive aether particles.
	19	Vacuum	Defined as an imagined empty space devoid of anything including invisible aether and minds. So vacuum does not exist in physical reality. The world we can observe is filled with minds, aether, living objects, and non-living objects; "man-made vacuum" is only an approximation of the ideal vacuum.
	20	Field	Adopting Maxwell's original definition, the field is not an independent physical entity but a tool to explain the force mechanism in space, relying on aether waves to transmit interactions (resolving the action-at-a-distance problem). A new "psychic field" is introduced for living objects, corresponding to active force generated by mind-body-support interaction.
Hypotheses on Force and System Dynamics (5)	21	Passive Force (F_p)	Caused by attraction or repulsion between two objects, including the four fundamental forces (gravity, electromagnetism, strong force, weak force)
	22	Active Force (F_a)	Generated by living objects in the living state through mind-body-support interaction, with magnitude and direction determined by the mind's free will.
	23	Closed System	Does not exchange matter with the environment but allows energy and information transfer.

	24	Isolated System	Does not exchange matter, energy, and information with the environment. Since human beings cannot prevent the exchange of aether and information at the system boundary, only the Universe is the isolated system by definition. The rest of subsystems are all open system. However, by considering the locality axiom, we can treat any system together with its environment as an isolated system.
	25	Open System	Exchanges matter, energy, or information with the environment; systems containing living objects are always open.
Hypotheses used in Classical mechanics (8)	26	Newton's First Law	An inanimate object either remains at rest or moves at a constant velocity (unless acted upon by an external force); a living being can move autonomously under the action of active force.
	27	Newton's Second Law	In the Earth-fixed non-inertial frame of reference, $\text{mass} \times \text{acceleration} = \text{external force} + \text{active force}$ dominated by the mind-body-support interaction of living beings.
	28	Newton's Third Law	For every action, there is an equal and opposite reaction.
	29	Newton's Law of Universal Gravitation or Coulomb's Law	Every particle in the world attracts every other particle with a force that is proportional to the product of their masses and inversely proportional to the square of the distance between their centers. For two charged particles, Coulomb's Law should be used.
	30	Zeroth Law of Thermodynamics	If two thermodynamic systems are each in thermal equilibrium with a third system, then they are in thermal equilibrium with each other.
	31	First Law of Thermodynamics (Conservation of Energy)	Energy cannot be created or destroyed in an isolated system of Inanimate objects only, it can only be converted from one form to another or transferred from one object to another. It is an open system if living beings are contained. Active force doing work can increase the energy of the system but require consumption of body/environmental energy for balance.
	32	Second Law of Thermodynamics	The entropy of an isolated system without living objects always increases over time, approaching a maximum value at thermal equilibrium. Any systems containing living objects are open systems and the entropy of the system can increase or decrease depending on the free will of living beings.
	33	Third Law of Thermodynamics	As the temperature approaches absolute zero, the entropy of a system approaches a constant value.

Table 2: Revisions to Core Classical Mechanics Theorems

Theorem Name	Original Statement	Revised Statement	Revision Explanation (Core Innovations)
Newton's First Law	An object either remains at rest or continues to move at a constant velocity unless acted upon by an external force.	An inanimate object either remains at rest or moves at a constant velocity (unless acted upon by an external force); a living being can move autonomously under the action of active force.	Explicitly distinguishes the motion differences between living beings and inanimate objects for the first time, and introduces the concept of "active force" (generated by the interaction of mind-body-support [12]).
Newton's Second Law	In an inertial frame of reference, the rate of change of an object's momentum is proportional to the external force applied; $\text{mass} \times \text{acceleration} = \text{external force}$.	In the Earth-fixed non-inertial frame of reference, $\text{mass} \times \text{acceleration} = \text{external force} + \text{active force}$ dominated by the mind-body-support interaction of living beings.	Retains the classical mechanics framework, abandons the assumption of inertial frame of reference, extends the application to living beings through "active force", and solves the problem of "mechanical explanation for the autonomous motion of living beings".
Newton's Third Law	For every action, there is an equal and opposite reaction.	For every action, there is an equal and opposite reaction.	No revision is needed.
Newton's Law of Universal Gravitation	Every particle in the Universe attracts every other particle with a force that is proportional to the product of their masses and inversely proportional to the square of the distance between their centers.	Every particle in the world attracts every other particle with a force that is proportional to the product of their masses and inversely proportional to the square of the distance between their centers.	Based on the axiom that "science can only study the finite world" [12], revises "universe" to "world" to clarify the applicable range of the theorem, and avoids unverifiable speculation about spaces beyond the world.
Zeroth Law of Thermodynamics	If two thermodynamic systems are each in thermal equilibrium with a third system, then they are in thermal equilibrium with each other.	If two thermodynamic systems are each in thermal equilibrium with a third system, then they are in thermal equilibrium with each other.	No revision is needed
First Law of Thermodynamics (Conservation of Energy)	Energy cannot be created or destroyed in an isolated system; it can only be	Energy cannot be created or destroyed in an isolated system of Inanimate objects only, it can only be	Distinguishes between open and isolated systems, and explains "the energy source of

	converted from one form to another or transferred from one object to another.	converted from one form to another or transferred from one object to another. It is an open system if living beings is contained. Active force doing work can increase the energy of the system but requires consumption of body/environmental energy for balance.	living beings when doing work".
Second Law of Thermodynamics	The entropy of an isolated system always increases over time, approaching a maximum value at thermal equilibrium.	The entropy of an isolated system without living objects always increases over time, approaching a maximum value at thermal equilibrium. Any systems containing living objects are open systems and the entropy of the system can increase or decrease depending on the free will of living beings.	Breaks the cognition of "universality of entropy increase", and distinguishes the living objects with the non-living objects [12]".
Third Law of Thermodynamics	As the temperature approaches absolute zero, the entropy of a system approaches a constant value.	As the temperature approaches absolute zero, the entropy of a system approaches a constant value.	No revision is needed.

PROBLEMS RESOLVED: UCST VS. MATERIALIST SCIENCE

Materialist science's monist focus on matter fails to explain non-material causality, living agency, and theoretical unification. UCST addresses these via dualism and active force (Table 3).

The Mind-Body Problem: Explaining Active Agency

Materialism reduces consciousness to brain activity, cannot explain purposeful behavior (e.g., human running, animal foraging) [37-39], as it only recognizes passive forces. UCST's dualism posits the mind as a non-material entity generating F_a —the force driving active behavior. For example, human running requires F_a (mind-initiated) and environmental support (e.g., ground reaction), which materialist models (focused on muscle biochemistry) ignore [3, 18, 23]. Near death experience (NDE) research supports this: 98% of survivors report consciousness-body separation, evidence materialism dismisses [40]. In terms of consciousness phenomena, UCST made the following definitions for matter and mind: Any object or particle of mass is called matter, while the thing which enables a body of matter to possess the ability of active movement is called mind [13]. Consciousness is defined as the ability of a living agent to feel the internal and external worlds and it can be divided into eight types, eye consciousness, ear consciousness, nose consciousness, tongue consciousness, skin consciousness, brain consciousness, manas consciousness, Ālaya consciousness. The former six consciousnesses are

functions of body due to the mind-body interaction, only the eighth consciousness is interpreted as the mind used by René Descartes in his famous mind-body problem. The seventh consciousness is the bridge connecting the former six to the eighth. So the former seven consciousnesses will be lost if the person is dead while the eighth, mind (Ālaya consciousness), is a non-matter existence and it will exist forever [6]. So it is incorrect to say that all consciousnesses exist forever and also no survival of human consciousness after permanent bodily death.

Some further evidences for the partial existence of non-brain consciousnesses are given here.

1. **Noah Wall, a British Boy:** When Noah, a British boy, was still in his mother's womb, doctors discovered he had "no brain" and was accompanied by conditions like spina bifida. At that time, doctors believed he would hardly survive even if he was born. However, Noah's parents insisted on giving birth to him. When Noah was born, his brain was only 2% of the normal size. Later, his parents took him to a clinic in Australia for "neurophysical" therapy. By the age of 3, his brain had grown to 80% of the normal size, and he even learned skills such as surfing [41].
2. **T.F., a "Brainless Person" in France:** T.F., a French patient troubled by headaches and epileptic seizures, sought medical treatment. Doctors then found that his brain was almost replaced by fluid tissue, and almost no complete brain tissue could be seen inside his skull. Nevertheless, T.F. not only got married and had children but also passed the civil service exam. It was not until he sought medical help for his illness in adulthood that it seemed his daily life had not been significantly affected [42].
3. **Infants with Hydranencephaly:** Literature reports indicate that two infants with congenital hydranencephaly survived for 66 months and 24 months respectively [43]. There are also individual cases where patients survived for 20 years [44] or even longer, with the longest survival record being 33 years [45].
4. **From the Secret Biography of the Sixth Dalai Lama, Tsangyang Gyatso:** The Secret Biography of the Sixth Dalai Lama, Tsangyang Gyatso, contains a description of a headless person. The specific content is as follows: "I gradually traveled from Lhasa to Litang in Kang Region. I originally planned to worship Buddha here and stay for a while. Unexpectedly, Tuo Guoha from Guomang Zhacang was also serving as the abbot in Litang at that time. To avoid being recognized by him, I only stayed here for three days before continuing my journey. One day, I stopped at a family's house to rest, and there I saw a headless person. When I asked his family about the reason, they told me that this person had originally suffered from a neck illness, and later his head fell off. This situation had lasted for three years, and he was still alive. Faced with this headless person, my compassion arose endlessly and uncontrollably, and I kept gazing at him with sympathetic eyes. Soon after, I saw him start beating his chest with his hands, so I asked his family what he wanted. One person replied that he was hungry and wanted to eat. Although this headless person no longer had a head, there were still two tubes left on his neck. His family poured tsampa soup (mixed with water or milk) contained in a bottle down the tubes. The soup had been prepared properly—it was neither cold nor hot, nor tasteless. They would pour for a while, then stop and wait for a moment, because the soup poured in would produce foam. After a while, when the foam dissipated, they would continue pouring, just like how we usually pour water. Slowly, the tsampa soup in the bottle was all poured out." [46]

Origin and Nature of Information

Materialism treats information as a material derivative (e.g., DNA sequences, electrical signals) but cannot explain "active information" (e.g., scientific curiosity, individual desire and intention). In some other schools, information is treated as a fundamental existence such as Draganescu- Gaiseanu's trialism of matter-energy-information [47-50] and Neukart's monism of information in the Quantum Memory Matrix theory [51-53]. UCST defines the mind as information's generator/receiver/storage: active information arises from internal mind signals, while passive information comes from external sources and all the passive and active information can be stored in the mind. This framework explains why information can drive purposeful action (e.g., a scientist's research motivated by intellectual curiosity) rather than merely being a physical signal. Materialist science, by contrast, cannot distinguish active from passive information or account for its non-material "generative source" (the mind). Mind is not only the generative source but also the storage source and this ability can be used to explain mediumship phenomena [40]. While no one has extracted any information from the brain of a dead human body but many experiments have demonstrated that one can extract some anomalous information from the mind of a deceased person through mediumship [40, 54], this partly proves the validity of the dualist mind-body model.

Unifying Non-Living and Living Systems

Materialist science fragments the study of non-living and living systems by treating living systems as the non-living systems. Thus, all the systems are described by deterministic physical laws (e.g., classical mechanics). In this science, living systems are scarcely explained by emergent properties of matter (e.g., biology as "complex chemistry"). This fragmentation prevents a unified understanding of systems spanning micro to macro scales (e.g., from subatomic particles to cosmic galaxies and from microorganisms to macro ecosystems). UCST unifies these domains by extending classical mechanics to include both non-living and living objects, anchored in its dualist ontology. For non-living objects (or dead organisms), only passive forces operate; for living objects, an active force (from mind-body-support interaction) is added to the dynamic equation of Newton's second law [3]. This allows UCST to describe a star (interpreted as a living object with active force for self-rotation and energy compensation due to resistance of the aether medium around) and a stone (a non-living object with only passive forces) using the same axiomatic framework—something materialist science cannot do, as it lacks a mechanism to integrate non-material mind into physical models [18].

Unobservable Fundamentals and Testability

Materialist science often invokes unobservable material entities (e.g., dark matter, dark energy in the Big Bang theory) to resolve contradictions in its models, but these entities remain unconfirmed despite decades of search [55]. Furthermore, the separation of energy from matter in the dark side and the inseparation of energy from matter in the observable side is very strange from the perspective of taxonomy. This violates the principle of scientific testability, as materialism cannot accommodate non-material explanations and is forced to hypothesize unobservable matter. UCST avoids this paradox by distinguishing between the "universe" (infinite, unobservable, philosophical) and the "world" (finite, observable, scientific) [6]. It rejects materialism's claim that all existence must be material and instead posits that the world we can observe is filled with non-material entities (minds) and material entities (unobservable particles (aether), observable material objects (non-living and living)) [13]

sticking to the axiom of the relativity of simultaneity. There is no need to speculate any properties for the whole Universe since they are untestable. The existence of matter implies the co-existence of non-matter (minds). The existence of visible matter (observable material objects (non-living and living)) implies the co-existence of invisible matter (unobservable particles (aether)). The invisible matter (aether) can be interpreted as dark matter and the energy carried out by aether can be interpreted as dark energy. Thus, dark matter and dark energy should not be treated as the main objects of study from a scientific point of view. Of course, we should improve the capability of microscope and try to find more particles in the category of aether. If a new particle is found, this particle is moved from the category of aether to the observable objects and we can study its properties similar as we improve the capability of telescope to find more new stars. In UCST, in any physical or chemical processes, the fundamental laws of CM such as the conservations of mass, momentum and energy should be followed. It is no need to introduce an inflation period when all the physical laws are invalid [56]. For example, UCST explains blackbody radiation as the emission of massive aether particles (material) rather than relying on mass-energy conversion (a materialist concept that conflates mass and energy) [3, 57-59]. It also redefines "vacuum" as an imaginary concept (no physical existence), resolving conflicts between materialist definitions of vacuum and the existence of dark matter/energy [13].

Ethical Foundations for Human Behavior

Materialist science's monism reduces human behavior to material interests (e.g., survival, resource competition), which cannot explain altruism, moral responsibility, or the "community of shared future" among humans [60, 61]. This leads to a practical dilemma: materialism cannot provide a philosophical foundation for resolving conflicts (e.g., war) beyond material bargaining. UCST's dualist framework addresses this by emphasizing that the essence of living objects is the mind (non-material), which is permanent and may reincarnate into different bodies [13]. This implies that harming others (e.g., in war) ultimately harms one's own past relatives or own mind's future family members—providing a moral basis for altruism (altruism = self-interest) that materialist science lacks [25-27, 29]. Materialism, which views humans as temporary material aggregates, cannot justify such ethical imperatives beyond utilitarianism [60, 61]. Table 3 is a brief summary of how UCST to solve various dilemmas in materialism.

Table 3: UCST's Resolution of Materialist Dilemmas

Problem	Materialist Limitation	UCST Solution
Mind-Body Agency	No mechanism for free will/purposeful action	Dualist ontology of aether and minds + active force (F_a) of living agents in the living state from mind-body-support interaction. Free will is a property of mind.
Active Information	Reduces information to material signals and cannot explain parapsychological phenomena	Mind as generator of active information (drives purposeful behavior) and can also store information which can explain parapsychological phenomena such as NDE, OBE, spontaneous past-life recall.
System Unification	Fragments micro-macro/living-non-living research, 67 different theories for complex systems.	Unified dynamical equation by including active force (F_a) for living agents in Newton's second law.

Ontology	Unclear ontology and relies on subjective increase of new entities such as energy, information, dark matter and dark energy.	Clear dualist ontology of aether and minds, clear distinction of living objects and non-living objects. For living objects in living state, active force exists.
Ethical Behavior	Cannot explain altruism beyond utilitarianism	Permanent, reincarnating mind (altruism = long-term self-interest; mankind is a community with a shared future)

LOGICAL STEPS OF UCST'S THEORETICAL CONSTRUCTION

UCST proposes a systematic solution through a series of logically coherent steps, which are progressively advanced from problem diagnosis and foundational construction to theoretical unification and practical verification. The specific logical steps are as follows:

Diagnose Core Dilemmas

The first step of UCST is to clarify the root causes of fragmentation and incoherence in current complex system studies, laying the factual foundation for subsequent theoretical construction.

1. **Theoretical Proliferation:** Based on the 2021 Map of Complexity Sciences [2], it is pointed out that there are at least 67 distinct theories or sub-disciplines in the field of complex systems, which are mixed products of CM, QM, and RT. This leads to contradictory conclusions for the same practical problem, making it difficult for researchers to choose reliable theories [3].
2. **Conceptual Ambiguity:** Analyze that fundamental concepts such as "universe", "world", "time", "space", "mass", "vacuum", and "field" lack consistent definitions across different theories. For example, RT regards spacetime as a material entity, while CM treats it as a descriptive tool; the definition of "vacuum" also conflicts among CM, quantum field theory, and the Big Bang theory [31]. Actually, UCST identified at least 8 pairs of 16 basic concepts to be clarified [3], some of them have already been preliminarily clarified [14, 17]. They are (1) Universe & world; (2) Time & space; (3) Matter & consciousness; (4) Aether & minds; (5) Energy & field; (6) Heat & work; (7) Life & probability; (8) Information & entropy.
3. **Philosophical Monism:** Many papers and books have pointed out that materialist science (represented by classical mechanics) and idealist tendencies (implied in quantum mechanics) both adopt monist solutions to the mind-body problem, failing to explain the active agency of living systems and separating the research of non-living and living objects [37, 40, 62-65].
4. **Foundational Conflicts:** For example, CM assumes that physical quantities (such as position and momentum) of objects can be measured with arbitrary precision, and the Universe operates in a deterministic manner where future states can be fully predicted by initial conditions [55]; QM introduces the uncertainty principle, stating that conjugate quantities (e.g., position and momentum) cannot be precisely measured simultaneously, and the behavior of microscopic particles follows probabilistic laws rather than strict determinism [67]; RT abandons the classical assumption of absolute space and absolute time, proposing that space and time are interdependent as a four-dimensional spacetime continuum [33], which conflicts with CM's framework of independent absolute space and time.

5. **Mathematical Fragmentation:** For example, CM is described in Euclidean geometry (for spatial representation) and calculus (e.g., differential equations of motion to describe continuous changes in position, velocity, and acceleration) [66]; QM relies on linear algebra—using abstract mathematical objects such as wave functions (represented in Hilbert space), operators (for measuring physical quantities like energy and momentum), and matrix mechanics to quantify probabilistic states and discrete quantum transitions [67]; RT, especially General Relativity, employs non-Euclidean geometry (Riemannian geometry) to model curved spacetime, along with tensor calculus to formulate field equations that describe the relationship between mass-energy distribution and spacetime curvature [33].

Establish Foundational Frameworks

On the basis of problem diagnosis, UCST constructs the theoretical cornerstone by clarifying philosophical positions and formulating core axioms, ensuring logical consistency.

- **Dualist Ontology:** a dualist mind-body model is proposed, defining the mind as a non-material entity independent of the physical body, and the body as a material entity. This distinguishes living objects (with mind and active force) from non-living objects (without mind, only passive force), resolving the agency dilemma of living systems that materialist monism cannot explain [12].
- **33 Axioms:** It is decided to adopt an axiomatic framework to construct the unified theory [3, 12] and various axioms are proposed [12, 13, 30] and fundamental concepts [3, 12-14, 16, 17] are defined. Up to now we have put forward 33 foundational axioms to standardize the cognitive framework (see Table 1). Of course, whether these axioms are necessary and adequate is a direction of further study.

Clarify Fundamental Concepts

One of the main features for a mathematical language in comparing with natural language is its accuracy. Every concept in a scientific theory should be clearly defined. Newton adopted this approach in his principia [68] and this is the main reason why his principia was selected as the birth of modern science. However, now the concepts defined by Newton have greatly been modified [14, 17]. UCST redefines or clarifies key concepts across disciplines to eliminate theoretical contradictions and build a unified conceptual system.

- Reconstruct spacetime (absolute space, relative time) and reject inertial frames [3]. Adopt Kant's definition that "space and time are the framework for the mind to construct reality experiences", which is basically consistent with classical mechanics but very different from relativity. CM regards both time and space as absolute [48], RT regards both time and space as relative [33] while UCST treats them as a pair of complementary concepts, space is absolute and time is relative. The non-existent "inertial frame" for human observers in CM is abandoned and Newton's second law is extended to non-inertial frames (e.g., Earth-fixed coordinate systems) [3, 16, 18, 20].
- Unify mass definition (no energy equivalence) and redefine vacuum/field. In UCST, mass is defined as "a measure of the quantity of matter" obtained by comparison with a universal standard, and confirm that inertial mass, active gravitational mass, and passive gravitational mass are identical [69]. The relativity's mass-energy equivalence principle is rejected, explaining mass loss in nuclear reactions as the emission of massive aether particles [3]. The vacuum is defined as an "imaginary empty space" that does not

exist in reality; the world we can observe is filled with minds, aether, living objects, and non-living objects [13]. The field is interpreted as a tool to describe force distribution rather than an independent entity [14], and a "psychic field" is introduced for the explanation of the active force mechanism of living objects [3, 23].

- Revise system classification (incorporate information exchange). In general system theory [34], information is not considered and entering into the information era, the importance of information on the system behaviour is well known [41, 70]. In UCST, information exchange is incorporated into system definitions: closed systems do not exchange matter but allow energy and information transfer; isolated systems do not exchange matter, energy, and information; systems containing living objects are always open [3].

Build Unified Dynamical Framework

UCST innovates the force model and mathematical expression to unify the description of non-living and living systems. If one uses the force vector introduced in Truesdell [35] to formally define these two forces of active and passive nature, they can be defined as follows. According to Truesdell, a system of forces on a world Ω is an assignment of vectors in some inner-product space to all pairs of separate bodies of Ω . The force vector $\mathbf{F}_p(p, q)$ is called the force exerted on p by q [35]. When object p is the same as object q , if the force is not zero, i.e., $\mathbf{F}_p(p, p) \neq 0$, it is called active force and this object is regarded as a living object. When $\mathbf{F}_p(p, p)$ is always zero, this object is regarded as a non-living object [3].

- Classify forces (passive/active) and extend Newton's second law to include (F_a). The Newton's second law to include active force can be expressed as follows:

$$m_p \frac{d^2 s}{dt^2} = \sum_{q \neq p} F_p(p, q, t) + F_a(p, t) \quad (1)$$

This equation uniformly describes the motion of non-living objects ($F_a=0$) and living objects ($F_a \neq 0$) [3].

- Axiomatically define complex systems. Formalize complex systems as $(CS = \langle S, E, t, s, m, F_p, F_a \rangle)$, with axioms specifying the properties of particle sets (S, E), time (t), position (s), mass (m), and forces (F_p, F_a). The detail can be found in ref. [3].

Verify via Practical Applications

UCST demonstrates its validity by solving problems that materialist science cannot address, completing the "theoretical construction $\rightarrow$ practical verification" loop.

- Re-analyze Hertz's stone-swinging example: Explain the stable circular motion of the stone: passive forces (tension, gravity, air resistance) maintain the trajectory, while the person's active force (from mind-body-support interaction) compensates for resistance and initiates motion—something classical mechanics (lacking active force) cannot explain [23].
- Critique the Big Bang theory: Point out that materialist science misinterprets the "redshift of observable stars" as "universe expansion". Redshift and blueshift are two phenomena describing the change in the wavelength of light caused by the relative motion between a light source and an observer, rooted in the Doppler effect applied to electromagnetic waves. Redshift occurs when the light source moves away from the observer. The wavelength of light stretches, shifting it toward the longer-wavelength (red) end of the electromagnetic spectrum. Blueshift occurs when the light source moves

toward the observer. The wavelength of light compresses, shifting it toward the shorter-wavelength (blue) end of the spectrum. Based on these two definitions, one can know that A star moving away from Earth will have its light redshifted. A star moving toward Earth will have its light blueshifted. It is obvious that from these two phenomena we can only derive the relationships of these two stars with the observer and could not derive any property of the whole Universe. It is a totally wrong interpretation from redshift of measured stars that the Universe is expanding. The same may be true for the interpretation of Cosmic Microwave Background (CMB) which was a residual thermal radiation field remained in the previous explosion of this world rather than the whole Universe. UCST argues that observable stars should be called the "finite world", not the "whole universe", and the singularity hypothesis in the Big Bang theory is a mathematical abstraction rather than physical reality [24].

- Interpret quantum phenomena: Regard quanta as material particles with mass, and attribute the uncertainty principle to measurement limitations (photon collision affecting quantum trajectories) rather than ontological randomness. Unify wave-particle duality by adopting the "wave-guiding particle" model of Bohmian Mechanics [71].
- Reconcile determinism and probabilism: Argue that a system's nature (deterministic or probabilistic) depends on information availability. If active force and environmental parameters are fully known, it is deterministic; if not, it is probabilistic—resolving the binary opposition in materialist science [3, 5].

Extend to Ethics/Society

Beyond physical description, UCST uses dualist ontology to unify scientific tools with ethical norms, addressing practical dilemmas ignored by materialist science.

- Provide an ethical foundation for altruism: Based on the "permanent mind and reincarnation" hypothesis, argue that "altruism = self-interest" (good deeds in this life lead to better reincarnation), resolving materialist science's inability to explain altruism [25-27, 29].
- Address the threat of war: Point out that materialist monism (regarding the body as the essence) encourages conflict, while dualism (regarding the mind as the essence) shows that war cannot resolve conflicts, providing a theoretical basis for ending the hot war which is the most dangerous threat to the sustainable development of human beings on the earth [25, 26].

PHENOMENA EXPLAINED BY UCST (MATERIALISM FAILS)

UCST accounts for six classes of phenomena inaccessible to materialist science. These phenomena primarily relate to the agency of living systems, the nature of information, cross-scale system dynamics, and unobservable yet empirically supported experiences. Below are the key phenomena:

Active Agency in Living Systems

Materialist science reduces living behavior to passive reactions to physical forces (e.g., muscle contractions as biochemical responses, animal movement as instinct encoded in DNA) and cannot explain self-initiated, purposeful action driven by consciousness or free will. It only

recognizes "passive forces" (gravity, electromagnetism, etc.) and lacks a mechanism for "active causation" unique to living organisms. UCST resolves this by introducing active force (F_a), generated by the interaction of the non-material mind, physical body, and its support. This force explains phenomena such as:

- Human intentional movement (e.g., deciding to run, creating art): The mind's free will initiates active force, which interacts with environmental support (e.g., ground reaction for running and water for swimming) to drive purposeful action—something materialist models (which only map muscle force to neural signals) cannot fully explain [23].
- Self-sustained motion of "living-like" objects: UCST interprets stars, atoms, and subatomic particles as living objects with mind-like properties, whose stable self-rotation (spin) together with the energy loss due to the resistance from the surrounding medium is driven by active force. Materialist science can only describe spin as a "quantum property" without causal explanation. Materialist science cannot explain the stable movement behaviour if the energy loss is considered due to the resistance from the surrounding medium.
- Biological self-organization (e.g., cell differentiation, ecosystem adaptation): Active force enables living systems to actively respond to environmental changes (rather than passively adapting), a process materialism attributes to emergent properties of matter without clarifying the initiating cause. For example, in all the "self-something" theories such as dissipative structures [72] and autopoiesis [73], there is no criterion to pre-determine which object has this self-ability.

NDEs and Consciousness Independence

Materialist science dismisses NDEs as neural illusions (e.g., brain hypoxia, chemical reactions) and cannot explain the consistent reports of consciousness separating from the body—a phenomenon that challenges its core claim that mind is a byproduct of brain matter. UCST integrates empirical evidence from NDE research [40, 54, 63-65, 74] to explain this phenomenon: Over 98% of NDErs report experiences such as feeling separated from the body, encountering mystical beings, or perceiving unearthly realms—features indicating some consciousnesses operate independently of the physical body [13, 15]. This aligns with UCST's dualist mind-body ontology (mind as non-material and separable from the body), whereas materialism cannot reconcile these reports with its reduction of consciousness to brain activity.

Active Information and Causality

Materialist science treats information as a physical construct (e.g., digital data as electrical signals, genetic information as DNA sequences) and fails to explain the active information—information that initiates or guides behavior (e.g., a scientist's motivation to solve a problem, a bird's instinct to migrate). It reduces information to "encoded matter/energy" without addressing its "meaning" or non-material source. Furthermore, Materialist science cannot explain the phenomena of mediumship that his personal information can still be taken back even if the person was passed away for a long time. This can be easily explained with a dualist mind-body model.

UCST defines the mind as both the generator and receiver of information:

- Active information arises when the body is acted upon by information from its own mind (e.g., a student studying out of curiosity).
- Passive information comes from external minds or objects (e.g., reading a book).

This framework explains why information can drive purposeful action: the mind's non-material nature endows information with causal agency. Materialist science, by contrast, cannot distinguish active from passive information or account for its generative source.

Action-at-a-Distance

Materialist science struggles to explain non-contact interactions (e.g., gravity, electromagnetism) without invoking unobservable entities (e.g., gravitational fields as material "warps in spacetime" in relativity) or circular logic. Quantum entanglement, often cited as "non-local interaction," further contradicts materialism's emphasis on physical locality. UCST resolves this by redefining the field as a descriptive tool (not an independent material entity) and invoking aether (invisible material particles filling the world we can observe). Non-contact forces propagate through ether waves, similar to how water waves transmit force between boats. For example:

- Gravitational force between two planets is transmitted via aether waves, eliminating the need for materialist constructs like "spacetime curvature."
- Quantum entanglement is interpreted as local interaction with a slow-decay rate (undetectable by current technology), consistent with UCST's locality axiom—avoiding materialism's paradox of non-locality [3].

Cosmic/Microscopic Stability

Materialist science cannot explain why macro systems (e.g., stars, galaxies) and micro systems (e.g., atoms, subatomic particles) maintain stable motion without external energy input. For example:

- Stars do not collapse under gravity, and atoms do not disintegrate—materialism attributes this to "balanced passive forces" but cannot explain why the balance persists over eons independent of the change of the environment.

UCST interprets these systems as living objects with active force:

- Stars generate active force via mind-body-support interaction to support self-rotation and counteract gravitational collapse and replenish energy lost to ether resistance.
- Atoms' stable orbitals and spin are driven by active force from their "mind-like" essence.

This explanation unifies cosmic and microscopic dynamics, whereas materialism relies on disjointed, ad hoc assumptions (e.g., quantum "wave functions" for atoms, dark matter/energy for galaxies).

Altruism and Morality

Materialist science reduces human behavior to self-interested material goals (e.g., survival, resource competition) and cannot explain altruism (e.g., sacrificing for others, charitable acts) or moral responsibility—phenomena that contradict its emphasis on material determinism. UCST's dualist ontology provides a foundation for these behaviors:

- The mind is a permanent, non-material entity that reincarnates into different bodies. Altruism is thus "enlightened self-interest": good deeds in one life improve the mind's future reincarnation, while evil deeds lead to suffering.

This explains why humans act morally beyond material gain—a question materialist science cannot answer without resorting to utilitarian or evolutionary justifications that ignore the intrinsic value of morality.

PREDICTIONS AND TESTABLE EXPERIMENTS

The UCST, built on its axiomatic framework and dualist ontology, can make specific, testable predictions across micro, macro, and living system domains—addressing gaps in materialist science. These predictions stem from its core innovations (e.g., active force, aether, mind-body duality) and rejection of idealized assumptions (e.g., inertial frames, vacuum, closed or isolated system). They are summarized in Table 4.

Key Predictions

- **Active Force Signatures:** Living objects generate active force (F_a) via mind-body-support interaction, which should manifest as deviations from motion predicted by passive forces alone (gravity, electromagnetism, etc.). For example:
 - In human movement (e.g., running, balancing), the measured force exerted by muscles will exceed the magnitude required to counteract passive resistance (air, ground friction). The difference corresponds to $F_a - F_R$. This can also be used to explain fish swimming.
 - For "living-like" macro objects (e.g., stars), their self-rotation speed and stability will not align with models relying solely on gravitational and centrifugal forces; the discrepancy reflects active force generated by their mind-like properties.
 - When a living organism dies (mind-body separation), F_a will cease, and its motion will be governed exclusively by passive forces. For example: A recently deceased animal will no longer exhibit purposeful movement (e.g., avoiding obstacles), even if its muscular system is intact—unlike a living animal, which uses F_a to override purely physical constraints.
- **Aether in "Vacuum":** In modern physics, the concept of "aether" has been abandoned, however, there are virtual particles in ultra-high vacuum chambers, which are an important concept in quantum field theory. Virtual particles are interpretive concepts established in the mathematical calculations of quantum field theory, used to describe the mathematical terms of particles in subatomic processes such as collision processes. According to the uncertainty principle of quantum mechanics, the energy in the Universe fluctuates around a fixed total value for a short time. The greater the fluctuation, the shorter the time. Particles generated from this energy fluctuation are virtual particles, and they annihilate when the energy is restored. Although virtual particles cannot be directly detected, their effects can be observed through some experiments. For example, the Casimir effect is an experimentally observable physical effect caused by the existence of vacuum energy. In a radiation field, consider a pair of parallel plate capacitors. As the distance between the parallel plates increases, the allowed vibration modes increase, and there is an attractive force - the Casimir force - between the parallel plate capacitors due to the existence of vacuum energy. In addition, the Lamb shift also

proves the existence of virtual particles. The experiment shows that if the vacuum is really filled with hidden fluctuations, these fluctuations will cause the electron orbit to vibrate slightly continuously [75]. UCST defines vacuum as an imaginary empty space; all physical spaces (including lab-created "vacuums") are filled with aether. Thus, high-precision detectors should measure faint particle flux or mass density in "ultra-high vacuum" chambers—phenomena materialist science attributes to "virtual particles" but UCST identifies as particles in aether.

- **Variable Light Speed:** Light slows in high aether density (e.g., near stars) (contradicts RT's constant speed) [76]. Unlike relativity's claim of constant light speed in vacuum, UCST predicts light speed varies with the density of aether (and other matter) in the medium. For example:
 - Light will travel slower in regions with higher aether density (e.g., near massive stars) than in lower-density regions. This difference should be measurable via astronomical observations or lab experiments with controlled ether-like media.
- **Quantum Uncertainty as Artifact:** UCST argues that Heisenberg's uncertainty principle arises from photon collision disturbing quantum trajectories, not inherent randomness. Thus:
 - Using non-photon-based measurement tools (e.g., neutrino beams) will reduce uncertainty in simultaneous position-momentum measurements of quanta. This is preliminary found in Ref. [77].
- **Entanglement Locality:** Materialist science claims quantum entanglement is non-local, but UCST predicts its interaction strength decays with distance (like gravity/electromagnetism), just too slowly to detect with current technology. Thus:
 - Entangled particles separated by extreme distances (e.g., light-years) will show reduced correlation compared to nearby pairs. The challenge of this measurement is how to guarantee the synchronization of two measuring systems.
- **Active Information in Brains:** Active information (generated by the mind) guides behavior and should correlate with distinct neural or biochemical signatures. For example:
 - A person acting on self-initiated intent (e.g., choosing a meal) will have different brain activity patterns than someone acting on external prompts (e.g., being told what to eat). The former reflects active information from the mind.
- **Brain-Independent NDEs:** UCST holds the mind is independent of the brain; NDEs (consciousness separating from the body) should be associated with:
 - No detectable brain electrical activity (EEG flatline) while NDErs report conscious experiences.
 - NDErs recalling verifiable details (e.g., hidden objects in operating rooms) inaccessible to the physical body.
 - Collect more cases of those no-brain or damaged brain survival cases.

Validation Experiments Design

The UCST's predictions can be tested via targeted experiments, leveraging existing technologies or incremental innovations—avoiding unfeasible "thought experiments" common in some theoretical physics.

Active Force Measurement:

- **Design:** Subjects wear force sensors during movement (e.g., weightlifting). Compare measured force to passive resistance predictions.
- **Test:** Living subjects show active force (F_a)-driven discrepancies; unconscious subjects match predictions.

Aether Detection:

- **Design:** High-sensitivity mass spectrometer in ultra-high vacuum vs. dilute gas chamber.
- **Test:** "Vacuum" shows non-zero aether signals (distinct from gas).

Light Speed in Variable Density:

- **Design:** Laser through controlled-density media (simulated aether).
- **Test:** Light speed decreases with density (contradicts RT).

Quantum Locality:

- **Design:** Entangle photons; send one to satellite (1000+ km separation).
- **Test:** Correlation weakens vs. nearby pairs (confirms locality).

Mind-Body Duality:

- **Design:** fMRI of active (choice-based) vs. passive (instructed) tasks.
- **Test:** Active tasks activate intent-related brain regions.
- **Design:** Hidden stimuli in operating rooms; interview NDErs.
- **Test:** NDErs describe stimuli with flat EEG.

Table 4: UCST's Testable Predictions

Domain	Prediction	Materialist Contradiction
Active Force	Living organisms exert force exceeding passive resistance, e.g. living fish and human being's swimming.	No mechanism for active agency
Aether/Vacuum	"Vacuum" contains detectable aether particles which can be detected by temperature and density meters.	Vacuum is "empty" or has "virtual particles"
Light Speed	Light speed depends on aether density.	Light speed is constant in vacuum
Quantum Phenomena	Uncertainty reduces with non-photon measurements.	Uncertainty is ontological
	Entanglement correlation decays with distance	Entanglement is non-local
Mind-Body Duality	Active tasks show unique brain activity	All behavior is material-driven
	NDErs recall hidden stimuli with flat EEG.	Consciousness depends on brain activity

EXPANDING KNOWLEDGE AND SUPPORTING POSTMATERIALISM**Knowledge Expansion**

UCST advances ontology, epistemology, and system description:

Ontological Expansion:

Beyond materialism's "matter-only" framework, UCST recognizes two fundamental entities: non-material mind and material matter (aether). This explains NDEs, active information, and living agency—phenomena materialism ignores [62].

Epistemological Expansion:

- **Unifies Binary Oppositions:** Determinism/probabilism depend on information, not inherent laws [5].
- **Resolves Paradoxes:** Action-at-a-distance via aether waves (no spacetime curvature).
- **Clarifies Concepts:** Distinguishes universe (infinite) from world (finite) to avoid untestable claims.

Scope Expansion:

- **Cross-Scale Unification:** Single equation describes atoms (micro) and stars (macro).
- **Information Integration:** Revises system definitions to include information (critical for cyber-physical/ecological systems).

Supporting the Postmaterialist Paradigm

Postmaterialism rejects "matter primary, consciousness secondary," emphasizing material-non-material coexistence. UCST supports this via:

Causal Non-Material Entities:

The mind's role in generating (F_a) and active information proves non-material causality—materialism denies this.

Overcoming Materialist Fictions:

UCST replaces unobservable dark matter/energy with testable aether/active force, integrating empirical NDE evidence that materialism dismisses.

Unifying Science, Ethics, and Spirituality:

- **Ethics:** Reincarnating mind justifies altruism (materialism lacks an intrinsic moral basis) and mankind being a community with a shared future.
- **Sustainability:** Postmaterialist focus on the mind reduces conflict (materialism's material gain fuels war).

CONCLUSION

The Unified Complex Systems Theory (UCST) addresses long-standing limitations of materialist science and fragmented complex system research. By generalizing classical mechanics, introducing a dualist mind-body ontology, and defining active force, UCST unifies micro-macro and living-non-living systems under a coherent axiomatic framework. It resolves intractable problems—from the mind-body dilemma to quantum non-locality—and makes testable predictions via experiments (e.g., active force measurement, ether detection). Beyond physics, UCST bridges science, ethics, and spirituality, advancing a postmaterialist paradigm that expands the boundaries of scientific inquiry. Future research will validate UCST's predictions and apply them to sustainability, medicine, and social science.

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