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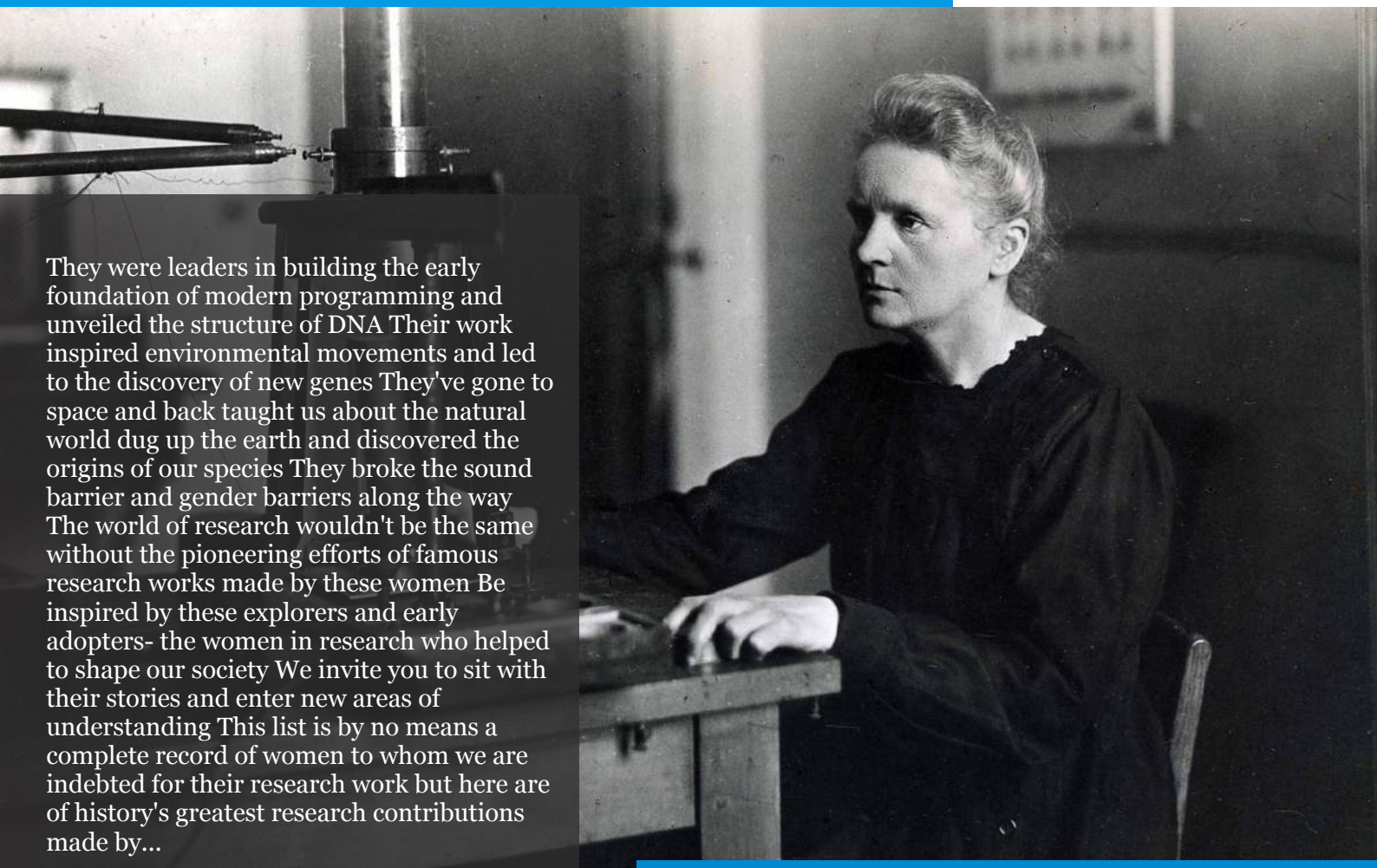

They were leaders in building the early foundation of modern programming and unveiled the structure of DNA Their work inspired environmental movements and led to the discovery of new genes They've gone to space and back taught us about the natural world dug up the earth and discovered the origins of our species They broke the sound barrier and gender barriers along the way The world of research wouldn't be the same without the pioneering efforts of famous research works made by these women Be inspired by these explorers and early adopters- the women in research who helped to shape our society We invite you to sit with their stories and enter new areas of understanding This list is by no means a complete record of women to whom we are indebted for their research work but here are of history's greatest research contributions made by...

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Research papers and articles

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Speed and the Speed of Light, Density, Change, and Absolute Zero-Motion and Change in the Principles of the Philosophy of the Cosmic Origin

Samo Liu

ABSTRACT

Speed is a physical or sociological term for the motion and change of matter — the distance traveled by matter per unit of time and the rate of change in the structural form of "existence" per unit of time. It relates to the three-dimensional spatial coordinate system and is a physical unit associated with time and space. It represents human-created physical knowledge and information that "materializes" space and time (Materialization), serving as a necessary condition for studying physics, the motion and change of matter, and as an important unit in the philosophy of matter and a key reference indicator in the philosophy of the cosmic origin.

The existence and change of position and structure are necessary indicators in the philosophy of matter and physics, and serve as causal–logical reference indicators in the philosophy of cosmic origin.

Keywords: motion, change and speed; density, structure and existence; speed of light and absolute zero; matter and non-matter; perception of existence; "physics.

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Samo Liu

ABSTRACT

Speed is a physical concept that describes the motion and change of matter. It refers to the distance traveled by matter per unit of time and the rate of structural change in existence over time. It relates to the three-dimensional spatial coordinate system and is a physical unit associated with time and space. It represents human-created physical knowledge and information that "materializes" space and time (Materialization), serving as a necessary condition for studying physics, the motion and change of matter, and as an important unit in the philosophy of matter and a key reference indicator in the philosophy of the cosmic origin.

The existence and change of position and structure are necessary indicators in the philosophy of matter and physics, and serve as causal–logical reference indicators in the philosophy of the cosmic origin.

Density is the physical unit of matter or energy's existence in three-dimensional space — the amount of matter–energy–existence per unit volume. It relates to the three-dimensional spatial coordinate system and describes the structure and form of space and the existence within space. It is human-created knowledge and information resulting from "materializing" space, representing a necessary condition for studying physics and the existence of matter, an important indicator in the philosophy of matter, and a key reference in the philosophy of the cosmic origin. Density is independent of time and describes only the structural distribution of matter or energy in space.

The speed of light and absolute zero are theoretical limits discovered in physics- units in Einstein's theory of relativity, Kelvin's "theory of absolute zero," as well as optics, electromagnetics, quantum mechanics, and thermodynamics (Samo Liu, 2024i). They are important knowledge and information in the philosophy of the cosmic origin.

This article interprets Aristotle's Physics and deduces that mechanics can be the theory of relativity of "existence".

Keywords: motion, change and speed; density, structure and existence; speed of light and absolute zero; matter and non-matter; perception of existence; "physics".

Author: China Occupational Safety and Health Association, Beijing, China.

I. LITERATURE REVIEW

In the history of the philosophy of science, Newton and Leibniz- philosophers of science who seriously contemplated the concepts and origin of space and time- disputed the notion of absolute space. Their debate is famously recorded in *The Leibniz–Clarke Correspondence*.

Newton proposed the concept of absolute space. Leibniz, from the perspective of defending God, opposed it; paradoxically, Leibniz ended up proving the concept of absolute space (Leibniz, 1996; Samo

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Liu, 2021c). In *The Leibniz–Clarke Correspondence*, Clarke described absolute space in many ways- "supra-world space," "space without bodies," "space as a property rather than an entity," and so forth. Leibniz, in just one sentence, scientifically proved the existence of absolute space: "Let me show you how I prove it - space is something absolutely uniform; if there were no objects placed in it, one point in space would be absolutely indistinguishable from another" (Leibniz, 1996, p.18).

Academia has long believed that Leibniz opposed absolute space, but a careful reading of his works reveals that he did not deny it. Rather, he debated with Newton and Clarke on *what* absolute space is. In doing so, he supplemented Newton's incomplete account and even proved its existence.

Without matter, there is no position or distance for matter to exist in, no temporal process or structural form of existence, and naturally no speed of matter's motion. This is a fundamental principle of the cosmic origin, demonstrated in the Newton–Leibniz debate.

In Newton and Leibniz's era, electromagnetics, thermodynamics, relativity, and quantum mechanics had yet to emerge. The divine act of creation was conceived only in terms of matter. Where, then, was the "divinity" of matter's creation? They did not have the knowledge or information to answer this. From his theological stance, Leibniz argued that God exists in that place where there is no matter, no material distance, and no material time. Since this divine nature was unknown, he cautioned against speculating lightly on the matter. Unfortunately, before the debate concluded, Leibniz passed away, leaving his reflections to later generations.

Einstein's theory of relativity tells us that matter is created from the "divinity" of light and the speed of light. It also teaches that matter — and all existence — exists in time with a "density" structural form and moves and changes under the name of "speed," with the ultimate limit of speed being the speed of light — a truth of physics. Einstein's message is not about "reversing spacetime," but about the way existence changes in form and process within spacetime. This profound insight compels us to reconsider the concept and origin of "time and space" (Samo Liu, 2025g).

Quantum mechanics tells us that matter is created from the "divinity" of particles, quarks, fermions, and bosons — a divinity already scientifically proven. It also tells us that this divinity has wave–particle duality, uncertainty, and entanglement when creating matter.

We do not yet know what kind of "divinity" creates particles and quarks, but physics has discovered dark matter and dark energy — forms of existence that conform to thermodynamic principles and are not at absolute zero.

Lord Kelvin's "theory of absolute zero" tells us that the lowest possible temperature at which all change in matter and existence ceases is absolute zero (0 K, −273.15 °C). At this state, density and speed do not exist — the minimal limit of matter and existence's motion and change. Later, the Planck temperature set the upper limit for matter's motion and change — the universe's highest temperature, 1.4×10^{32} °C, where particle energies approach the Planck energy (2×10^{9} J) and corresponding wavelengths shrink to the Planck length (1.6×10^{-35} m).

By the same logic, the speed of light is the upper limit of matter's motion, while zero speed and zero change correspond to the lower limit — absolute zero.

The principle of the cosmic origin tells us: heat is not a force but a human-created physical concept- something perceived and sensed by "human beings," "matter," and "existence," expressing the motion, Change and Balance of "existence." Absolute zero, the Planck temperature, and the speed of light are fundamentally equivalent in origin — representing "zero" and "infinity" of existence (Samo Liu, 2024i) - a proposition for academic discussion and verification.

Humankind has also discovered the principles of electromagnetics, revealing that all matter and existence have structured forms with Yin–Yang structural states. Electromagnetic waves are light waves at the speed of light, and all energy can be expressed in terms of electromagnetic and thermal energy.

For example, space without matter or material energy — "Wu Ji无极" (Infinite and One, yuanyi元一) — is a binary Yin–Yang state, alive, and can be called an electromagnetic (Yin–Yang阴阳) state. Under the divine influence of mechanics, the universe enters a "Tai Ji太极" Yin–Yang form of "Energized matter" and "materialized energy," still a living electromagnetic (Yin–Yang阴阳) structure.

Science has discovered theories such as the Big Bang and black holes, all of which point to the existence of a "divinity" creating the "Wu Ji无极" and "Tai Ji太极" of the universe, generating the knowledge and information of known existence. Whatever logical framework is applied, "divinity" can be expressed through "physical mechanics." The principles of such mechanics are the principles of the Yin–Yang perception of all existence and the living universe — existence has perception, and mechanics is the theology of the cosmos (Samo Liu, 2024i; 2024h; 2024g).

This principle can be logically found, via dialectical materialism, in Taoist philosophy, Buddhist philosophy, and the ancient Greek philosophical thought on the cosmic origin. The knowledge and information created through the human principles of cosmic origin and the philosophy of matter can already form a self-consistent system. I have written many articles on this and call upon the academic community for discussion (Samo Liu, 2025f).

Mach was a great physicist. He refuted Newton's proof of absolute space by pointing out its weaknesses and raised doubts about the concept of absolute space. Mach's opposition was valid, but it could not prove Newton's absolute space to be wrong. Newton, using the (mathematical) physical principles of the philosophy of matter, argued that space without the existence of matter inevitably leads to contradictions — a point already proven by Leibniz. Leibniz's proof of absolute space did not address Mach's objections.

Mach authored *The Science of Mechanics: A Critical and Historical Account of Its Development* (Ernst Mach, 2014). From studying this work, it appears he was a mathematical formalist who regarded the universe in a mechanical way, treating matter and existence as a kind of "lifeless being." Mach was a staunch materialist, and there is no evidence that he explored or studied the concept and origin of space and time. His thinking, however, influenced Einstein.

For reasons unclear, academia came to regard absolute space as refuted. The deeper roots likely lie in post-Aristotelian philosophy, where the universe was "assumed" to be material — making space without matter unimaginable. Yet the achievements of thermodynamics, relativity, and quantum mechanics compel humanity to imagine space and time without matter, in order to reflect on the origins of the universe and of humanity (Liu Hongjun & Samo Liu, 2020; 2021a).

This paper discusses the fundamental principles of motion and change in the cosmic origin from the perspectives of speed and the speed of light, density, and the two "relativities" of absolute zero, as well as considering the "relativity" of electromagnetics, the strong force, and the weak force.

The discussion focuses on the scientific–philosophical ideas of Newton and Leibniz and on Aristotle's *Physics*. The philosophical foundation lies in the cosmic origin thought of Taoist philosophy, Buddhist philosophy, and ancient Greek philosophy, combined with dialectical materialism and modern scientific philosophy. The scientific knowledge base draws from modern physics, modern science, and mineral processing.

II. DISCUSSION

Speed and density are the main topics of this paper. They represent the form and process of matter, energy, and all existence, reflecting the change and movement of "existence" in its process of being, in both form and position.

Change is the theme of existence. It symbolizes the phenomenon of life within the process of existence and the innate faculty of perception; motion is an objective form of the change of matter.

"Changing existence" belongs to the *yang* aspect; in physics, it is described as matter and energy, including the possible existence of dark matter and dark energy discovered by physics. The origin of change in *yang* existence is governed by the *yin* "mechanical divinity" — a form of causally conditioned governance — which is referred to as information (Samo Liu, 2024a; 2024b).

Mechanics is the mutual relationship of "perceiving" and "being perceived" within the process of existence. This "process" has been depicted by humans using language, text, numbers, and natural phenomena of the solar system, and is called a "unit of time." Time may be the process by which existence perceives mechanics; all mechanics can be described by thermodynamics (Samo Liu, 2025c).

The forms of existence have been depicted by humans as spatial forms — for example, the material world is three-dimensional space, while the non-material world may be zero-dimensional or non-three-dimensional (Samo Liu, 2021a; 2021b; 2021c).

Speed is, in the conventional expression, the change in position/distance and structural form of matter per unit of time. This is the expression physics must adopt for study and representation — but it omits much.

For instance, at the macroscopic level, we overlook the fact that the energy state of matter as mass is constantly changing during motion. At the microscopic level, we treat the existence of matter as lifeless and fixed, whereas in reality this "material existence" is constantly changing in the perceptual process of microscopic thermodynamic time. This change is not purely a physical concept but a "physical–chemical" concept — a concept of the cosmic origin and of the "principle of relativity."

Density is the amount of matter and energy within a unit of space. This unit does not require time; time can be ignored. We may regard this structural form of matter and energy's existence as instantaneous or fixed — a "lifeless" existence. However, this is a theoretical form that can be treated as a real form, yet in reality it is always subject to the principle of relativity of "absolute change."

In physics, there is a great unit for time change — the mathematical unit Δt. Using conventional time units — years, months, days, hours, minutes, seconds — we compare the length of processes. However, if observed with Planck time, this time description is extremely large; if observed with the cosmic time unit of a "kalpa劫," it is extremely small.

Similarly, for length, we commonly use meters, decimeters, centimeters, and millimeters to compare ΔL. Observed at the Planck scale, these are huge; observed in cosmic length units such as light-years or parsecs, they are tiny.

The durations of such processes and the magnitudes of such lengths are constantly changing at every stage of existence. Therefore, at each stage, a zero-coordinate system must be established to compare relative changes. In various coordinate systems, there are beginnings and endings to the changes in form and process.

Their origin lies in light and absolute zero, and they ultimately return to light and absolute zero. All "changing existences" in the universe- whether dark energy, dark matter, particles, quarks, molecules, atoms, matter, or even humanity- share the same concept and fundamental principle of the cosmic origin.

Next, in accordance with the dialectical materialist principles of the philosophy of science, we will reflect on Newton and Aristotle's discussions of these matters, reconsider the relativities of various mechanics, and discuss these questions in connection with the cosmic origin thought in Buddhist philosophy, Taoist philosophy, and ancient Greek philosophy.

2.1. Discussion 1: Existence, Perception, and Sensation

The question of *sensation* is not discussed in this paper. Sensation is an innate faculty universally possessed by humans, and in fact, it is a natural endowment universally possessed by cellular matter.

The question of *perception*, however, is one that academia should attach great importance to and discuss seriously.

From the human perspective, discussing the issue of self-perception can find systematic methods and answers in the cosmic origin thought of Buddhist philosophy and Taoist philosophy. Likewise, traditional medicine and cultivation practices of different nations and ethnicities can also be used to discuss human self-perception — for example, traditional Chinese medicine and Qigong in China.

The quieter the environment, the easier it is to access human self-perception; human sensation will influence human perception. Even ordinary matter without sensation, whether in material or energy form, has perception of its own existence.

The perception of existence can be proven by the existence of "existence" itself, by the motion and change of existence, and by the process of existence. All forms of existence — whether zero-dimensional, non-three-dimensional, or three-dimensional — may experience the process of existence as a comprehensive perception of various forces, ultimately reflecting the thermodynamic balance and cycles of all forms of "existence."

Such "existence," whether dark matter, dark energy, particles and quarks, molecules and atoms, or cells and human cells,Even planets and galaxies, is the totality of matter and material energy responding to and changing in perception of various "forces."

Gravitation is the perception between matter or material energy that possesses "mass." This perception has formed the superclusters, galaxy clusters, and galaxies of the material universe, creating the Milky Way and the Solar System, whose present motion and stability have been utilized by humankind's ancestors to establish the system of process units — years, months, days, hours, minutes, seconds. The creation, existence, motion, and change of matter or material energy possessing "mass" are processes of thermodynamic motion, change, and equilibrium.

Gravitation exists only in the presence of "mass." The highest motion speed of matter is the speed of light, the highest thermal energy is the Planck temperature, and the lowest thermal energy is absolute zero. Beyond this range, gravitation does not exist, because "mass" does not exist, and thus perception between masses does not exist (Samo Liu, 2024i).

Electromagnetism is the perception between the yin–yang structures of matter or material energy. It is unrelated to material mass, but depends on the electric nature of the existence's structure, the polarity of electric charges, and the position of those charges. The medium of yin–yang structural perception is

the light wave. Both material and non-material existence possess this endowment, which conforms to thermodynamic principles, and it is the force responsible for the creation, existence, change, mutual repulsion, and mutual generation of matter (Samo Liu, 2024i).

The strong and weak forces are structural perceptions between particles and quarks. Such perceptions both grant matter "mass" cohesion and enable the yin–yang dual functions of radioactive decay. In the formation process of material "mass," they exhibit wave–particle duality, uncertainty, and entanglement, all of which conform to the principles of thermodynamic motion, change, and equilibrium. Their creation and existence can have non-material zero-dimensional forms, "non-material" one-dimensional lines, two-dimensional membranes, or material three-dimensional forms (cf. M-theory). They may or may not form atomic "mass," depending on thermodynamic principles and on the yin–yang "causal" perception between particles and quarks. The description of their forms can use the Planck length (Samo Liu, 2024i), and the description of their processes can use Planck time.

The forms and processes of dark matter and dark energy are currently unknown and require further theoretical and experimental study in quantum mechanics. However, their principles should conform to the thermodynamic principles of the cosmic origin — perhaps they *are* the thermodynamic principle itself.

Thermodynamics is the comprehensive description of the creation, existence, change, balance, and cycles of all existence in the universe; it is the foundational principle of the cosmic origin.

Through the discussion and analysis of perception in "existence" throughout the universe, we can conclude: Einstein's theory of relativity does not describe the curvature of spacetime, but rather the "relative" motion and change of existence — particularly of the "existence" of material mass — in space and time. It is also a description of the thermodynamic "absolute" existence and change of both material and non-material existence.

Therefore, Einstein's relativity of mass–motion and the Kelvin–Planck thermodynamic relativity are the two fundamental relativities of the motion and change of existence in the universe (Samo Liu, 2024i).

By this logic, electromagnetism, the strong interaction, and the weak interaction should also have their own physical "principles of relativity."

2.2. Aristotle's" Physics" (Aristotle, 2019)

Aristotle's *Physics* is a work that studies origins, causes, and principles.

There are many versions of the Chinese edition of "Physics", totaling eight chapters. Here we quote one version. (Aristotle, 2019)

Chapter 1: Research Subjects and Methods (pp. 1–29)

In Chapter I, Section 1 (Aristotle, 2019, p.1), he proposes that the key to understanding natural things is to study and understand their origins, causes, and principles.

Section 2 (p.2) examines origins. Clearly, Aristotle did not study the systematic cosmic origin thought of Buddhist and Taoist philosophy; instead, he analyzed fragments of ancient Greek philosophers' views on origins — such as the issues of "existence," "the One," and "all things being one." Given the knowledge and information available at the time, Aristotle was unable to analyze these issues clearly.

In Section 3 (p.7), Aristotle used logic to critically evaluate the ancient Greek cosmic origin viewpoints, analyzing and criticizing the idea that the origin is "One" or “existence.”

Without the scientific knowledge of modern physics, quantum mechanics, relativity, or thermodynamics, Aristotle in Section 4 (pp. 11–14) critically addressed, one by one, ancient Greek philosophical views on the cosmic origin, such as the problem of “the One and the Many,” ultimately leaning toward Empedocles’ ideas. Notably, at that time the number zero and the concept of place value did not yet exist.

In Section 5 (pp. 15–18), Aristotle summarized the ancient Greek philosophical view of the cosmic origin as “opposites.” Evidently, ancient Greek philosophy at the time reflected, to some extent, the yin–yang thought found in the *I Ching*.

Sections 6 and 7 (pp. 18–25) discuss whether the number of origins is two or three. At this point, I am reminded of the *Tao Te Ching*’s idea: “一生二，二生三，三生万物” (*No translation*).

Sections 8 and 9 (pp. 25–29) employ the logical thinking of the philosophy of matter to evaluate the ancient Greek philosophical logic of "existence" and “non-existence,” pointing out the importance of logical analysis in problem-solving. Several terms are mentioned here: “change,” “opposite,” “material,” “privation,” “form,” and particularly the task of “first philosophy.” Chapter I is essentially Aristotle’s summary and synthesis of ancient Greek philosophical discussions on the cosmic origin.

“First philosophy” is the philosophical method Aristotle developed from the knowledge and information about the "material world" available to humanity at the time. Using this to study the cosmic origin, I refer to it as “the philosophy of matter.”

Chapter 2: The Study of Nature and Change (pp. 30–55)

In Chapter II, Section 1, Aristotle notes that some existing things exist by nature, while others exist due to other causes. All natural things clearly have within themselves a source of motion and rest. “Nature” is the inherent source and cause of motion and rest in the thing to which it belongs (pp. 30–33).

In his dialectical analysis of nature, he points out that many such things obviously exist, yet some try to prove what is clear with what is unclear — showing their inability to distinguish between self-evident and non-self-evident matters. This is the scientific–philosophical dialectic for analyzing and viewing things, and it is the starting point and foundation of the philosophy of matter, demonstrating that human knowledge and information are always stage-specific relative truths.

Section 2 (pp. 34–37) studies the differences between the work of mathematicians, natural philosophers, and philosophers of idealism. The distinction lies in the objects of nature versus the objects of mathematics. If the truth or reality of nature is disregarded, both philosophers and mathematicians can design theoretical frameworks at will — for example, the philosophical concepts of relativity’s “four-dimensional spacetime” and M-theory’s “hyperspace” model.

Sections 3 through 6 study the concept of “primary cause” (*benyin*) (pp. 37–47), using the logical framework of the philosophy of matter to examine the fundamental causes of “generation and destruction” and “natural change.” In the study of “chance” and “spontaneity,” Section 4 holds that chance and spontaneity are terms used by metaphysicians and philosophers to describe their understanding of things. Section 5 holds that human subjective consciousness can, for a certain purpose, make judgments and form understandings about chance and spontaneity. Section 6 offers a basic conclusion: spontaneity and chance are ways humans reflect upon natural outcomes, and they result from the uncertainty of the “primary cause” (p. 47).

Sections 7 through 9 (pp. 48–55) extend the discussion of the "primary cause" into the logical analysis of the "four causes" — material cause, formal cause, efficient cause, and final cause. This method of logical thinking has its roots in the philosophy of matter and is equally applicable to the philosophy of the cosmic origin. Section 8 raises the question: *Do natural activities have a purpose?* It ultimately concludes that nature is itself a cause and is indeed the final cause. Given the knowledge and information of his time, Aristotle could not clearly articulate what the "final cause" was; he was not a practitioner of cultivation-based perception, but rather a rational logical thinker.

The *Tao Te Ching* regards the universe as "无为而为" (*wu wei er wei*). Section 38 holds that the "final cause" of the universe is the balance of yin and yang (Liu Hongjun & Samo Liu, 2021d), which can be described in terms of thermodynamic creation, motion, change, and equilibrium (Samo Liu, 2024i).

In Section 9 (pp. 53–55), Aristotle uses the philosophy of matter to discuss and study the meaning of necessity in natural objects and natural existence, introducing the concepts of *material* and *material cause*. With today's scientific knowledge and information, one could classify dark matter and dark energy, particles and quarks, molecules and atoms, cells and human beings, into the system category of *material* and *material cause*.

His study concludes that these existences are necessary constituents of the natural universe. They include what is called material existence and its motion and change. He emphasizes that the purpose is the cause of the material, not that the material is the cause of the purpose. The purpose is for the sake of something, and the starting point arises from human definition (p. 55). Therefore, in my study of the cosmic origin, I define the "starting point" as the zero-origin coordinate system of form and process. (Samo liu, 2025g; 2025h)

Chapter Ⅲ *researches Motion and the Infinite (pp. 56–80)*

Section 1 studies the nature of motion (pp. 56–57). Aristotle believes that nature is the source of motion and change. Without space, void, and time, motion cannot exist; without things, there is no motion. Aristotle uses the philosophy of matter to study motion. Evidently, Leibniz's thinking in proving absolute space is consistent with Aristotle's in this regard. Without the knowledge and information of quantum mechanics, relativity, and thermodynamics, it would be impossible to fully conceive of space and the motion and change of existence within space.

He also holds that the number of kinds of existence corresponds to the number of kinds of motion and change (p. 57). His study leads to two conclusions (p. 59):

1. Motion is the realization of a "potential being" as something capable of motion. Today's knowledge and information allow us to interpret "potential being" as the mechanics of physics — something that could not be explained with the knowledge of Aristotle's time.
2. The time during which motion takes place is exactly the time during which the potential being realizes its potential — neither before nor after. Clearly, Aristotle studied the phenomenon of time, but not the origin of time; ancient Greek philosophy lacked knowledge in this area.

Section 2 continues to apply the philosophy of matter to the nature of motion (pp. 59–61), grouping motion and change together and analyzing them through the concept of contact interaction, distinguishing rest, mover, moved, and co-movers. The mover is the origin or cause of motion.

Section 3 studies the mover and the moved, holding that motion occurs within the thing capable of motion and change (p. 61), and that the realization activity of the mover is manifested in the realization activity of the thing moved; the realization activities of the two are unified. He further holds that the mover and the moved are both within the moved, or that the active resides within the active, and the passive within the passive.

Aristotle, as the creator of the philosophy of matter, was likely not a practitioner of cultivation and did not study the issue of “perception.” However, I believe that from the perspective of the philosophy of matter, he logically proved that the motion and change of "existence" is in fact mutual perception. In this section, he proved this point using the logical language of the philosophy of matter.

Interestingly, Aristotle himself might not have fully grasped the significance of this logical deduction, as his works did not elaborate on this conclusion. Yet, no mechanical formula or principle has ever deviated from this profound logical reasoning.

Section 4–8 discussed The Infinite

Section 4 discusses the views of early philosophers on the finite and the infinite, noting that philosophers studying natural philosophy have all discussed the problem of the “infinite,” with most considering the infinite as the initial origin of things (p. 64). Aristotle classifies the views of early philosophers into three types:

One type places the "infinite" among perceptible things, such as Pythagoras. Undoubtedly, such people were practitioners of cultivation, holding that the heavens beyond are infinite (p. 64). In my writings, I classify this under the cosmic origin concept of *Wu Ji*无极 (Limitless).

Another type places the infinite in both perceptible and rational realms, such as Plato, who held there are two kinds of infinite: the infinitely large and the infinitely small (p. 64). In my writings, I classify this under the material origin concept of *Tai Ji*太极 (Supreme Ultimate).

A third type regards the "infinite" as a certain natural thing they call an element. Within this view, there are two opinions: one holds the number of elements is finite; the other, infinite (pp. 64–65). They also hold that the infinite is sacred, because sacred things do not perish (p. 66).
Aristotle reluctantly observes: to deny the infinite creates many inconsistencies; to admit the infinite requires answering whether it exists as a substance, as an attribute inherent in some thing, or as both (p. 67).

From this Section, I conclude: (1) Aristotle was not a practitioner of cultivation but a rational logical thinker; (2) ancient Greek philosophy’s study of the cosmic origin was unsystematic and fragmentary, lacking the systematization of Eastern philosophy, which led Aristotle to face difficulties in analyzing these issues. Nevertheless, this did not deter him — he went on to rigorously analyze and critique the above viewpoints.

Section 5 offers a logical critique of the Pythagorean and Platonic concept of a separately existing infinite (pp. 67–73). Section 6 discusses whether the infinite exists and in what sense it exists (pp. 74–77). Section 7 discusses various ancient Greek philosophical views of the infinite. Section 8 refutes arguments for the existence of an actual infinite (pp. 79–80).

Using the logic of the philosophy of matter, Aristotle analyzes in what sense the infinite exists, in what sense it does not, and what the infinite actually is. These logical analyses in the philosophy of matter are in essence logical analyses of the cosmic origin. Although they could not be fully explained with the knowledge and information of his time, today’s scientific knowledge, modern physics, and research achievements can clarify them.

I invite the physics and mathematics communities to reflect: when you encounter the problem of zero and infinity in your practical work, it may be worth recalling Aristotle’s thinking on the infinite.

Chapter 4 discussed Space, Void, and Time

This Chapter discusses space, void, and time- fundamental issues in human philosophical thought and key to understanding motion and change.

Section 1 examines whether space exists (pp. 81–83). Section 2 asks whether space is form or matter (pp. 84–85). Section 3 investigates whether a thing can be in itself and whether space can be in space (pp. 86–88). Section 4 studies what space actually is (pp. 89–93). Section 5 offers inferences about space (pp. 94–96).

It is clear that Aristotle approached space through the philosophy of matter. Given the knowledge and information available in his time, he could not study space from a non-material perspective. The "unknown" regarding "existence" within space prevented him from expressing the cosmic origin and the origin of matter. Nevertheless, through clear logic in the philosophy of matter, he articulated several points:

> Every elemental body (existent) tends toward its own particular space (p. 95).
> Form is the limit of a thing; space is the limit surrounding a body (p. 91).
> Space is an unmoving container (p. 93).

I consider these statements to be logical inferences, within the framework of the philosophy of matter, about certain partial essences of cosmic-origin space. I will prove the "origin" and "ontology" of "space" in another article.

Sections 6–9 researches The Void

Section 6 studies the views of other scholars on the void (pp. 97–98). Section 7 examines and discusses the meaning of the void (pp. 99–101). Section 8 discusses void not separated from matter (pp. 102–107). Section 9 studies void within objects (pp. 108–110).

I interpret Aristotle's "void" as referring to the "non-material existence" within space. Without modern scientific knowledge and without the systematic perceptual thought of Eastern philosophy, it was difficult for him to study void through the philosophy of matter. Some ancient Greek philosophers affirmed the existence of void; others denied it — leading to contradictions in their studies and conclusions on the cosmic origin (p. 99).

The research and thinking in Section 7 deserve attention from today's academic community. Aristotle studied the existence of "nothing" in space — specifically, the existence of "non-material" within space. He reasoned, using the logic of the philosophy of matter, that it is easy to refute the grounds for proving the existence of void (pp. 101). However, Aristotle did not lightly deny the existence of void.

More than two millennia later, we can reassure Aristotle that what exists there is the "material" aspect of "non-material" energy and information — the origin and the destination of matter (Samo Liu, 2024i).

Section 8 explains that there is no void separated from objects — a typical philosophy-of-matter view in analyzing space and void. If it would be unfair to criticize Aristotle with today's knowledge and information, then the last sentence of Section 8 allows his explanation to be self-consistent: there is no void separated from "existence," because this "existence" can be understood as a union of matter and non-matter (Samo Liu, 2024i).

Section 9 discusses void within objects. This is clearly an application of the philosophy of matter to study void within material objects — in essence, a discussion of the density of material existence.

Modern physics has overturned this form of logical analysis. The existence of void is both inside and outside objects. Theories in quantum mechanics, relativity, and cosmology tell us that we should rethink the origin of the universe and humanity from the perspective of energy and information.

Section 10–14 discussed Time

Section 10 examines doubts about the existence of time (pp. 111–112). Section 11 asks: What is time? (pp. 113–117). Section 12 studies various properties of time (pp. 118–121). Section 13 defines several time-related terms (pp. 122–124). Section 14 presents further thoughts on time (pp. 125–128).

Aristotle thought about time using the philosophy of matter, which reveals that ancient Greek philosophy lacked research on the "origin of time." Treating time as a "material existence" led to the philosophical line of thought in modern physics concerning the "curvature of spacetime."

Taoist philosophy treats time as "the process of existence" and names it through the natural phenomena of the solar system. The *Tao Te Ching* expresses this as: "道可道, 非常道, 名可名, 非常名" and "常有欲以观其徼" (Laozi, 2019), indicating that the form and process of the "being" of existence are finite, bounded, and have beginnings and endings. Humans can name them with language, text, and numbers, but such naming often captures the form rather than the origin (Liu Hongjun & Samo Liu, 2021d).

The *Wenzi* calls the process of time "往古来今谓之宙。" The *Zhuangzi* expresses it as "有长而无乎本剽者宙也" (Samo Liu, 2024i). The *Huangdi Neijing* holds that the human body's cells can perceive the process of time. In my research on stones, I believe both matter and existence can perceive the process of time (Samo Liu, 2025d).

Buddhist philosophy calls the process of existence "du度" (Buddhist expression of the process of existence) and refers to the unit of the universe's existence process as a "kalpa, " defining a kalpa as one day in the life of Brahma — equivalent to 4.32 billion human years. This is a great creative achievement by humankind's ancestors in conceiving the concept of cosmic time (Samo Liu, 2025c; Liu Hongjun & Samo Liu, 2024).

Humanity's creation of everyday time units is likewise a philosophical contribution to measuring the process of material existence. Our ancestors named the Earth's orbit around the Sun a *year*; the Moon's orbit around the Earth, a *month*; the process of one year is about twelve months; the Earth's rotation, a *day*; a day divided into twelve double-hours and twenty-four single hours; each hour divided into sixty *minutes*; and each minute into sixty *seconds*. These fixed units for the process of existence were created by humans as an informational tool for measuring processes, enabling humanity to express the speed of motion and change in material processes (Samo Liu, 2025c).

Quantum mechanics introduced the Planck time unit to express the process of existence for particles and quarks. Without human beings and without the human expression of knowledge and information, the universe proceeds according to its processes, entirely unaffected by whether or not humans express it. It is merely that the universe would lack one particular tool for expressing information.

Accordingly, if humans claim that time can bend or reverse, this only shows that human thought has bent itself. There is only one possibility: the perception that humans and "existence" have of their own process of existence is a natural one.

Chapter 5 discussed The Study of Motion and Change

Section 1 classifies motion and change (pp. 129–132). Section 2 studies the classification of motion "by nature" (pp. 133–136). Section 3 investigates the meanings of several terms: "together," "separate," "contact," "indirect," "successive linking," "successive contact," and "continuity" (pp. 137–139). Section

4 examines motion of the same kind and different kinds (pp. 140–144). Section 5 analyzes the opposition of motions (pp. 145–146). Section 6 analyzes the opposition between motion and rest (pp. 147–152).

This chapter studies the endowment and essence of matter and "existence," as well as the thermodynamic properties of existence — its forms and processes, which is the theme of my article.

Chapter 6 researches Continuation of the Study of Motion and Change

Sections 1 and 2 examine how every continuum consists of continuous yet divisible parts (pp. 153–161). Section 3 studies how a moment in time is indivisible, and that nothing can move or be at rest within a moment (pp. 162–163). Section 4 analyzes that any moving thing is divisible (pp. 164–167). Section 5 states that what has become has already reached its end (pp. 168–171). Section 6 holds that if something changes during a given time, it changes during every part of that time (pp. 172–174). Section 7 discusses the finitude and infinitude of motion magnitude and mover (pp. 175–178). Section 8 concerns tending toward rest and rest itself (pp. 179–181). Section 9 refutes arguments denying the possibility of motion (pp. 182–184). Section 10 states that things without parts cannot move (pp. 185–188).

From my study of Chapters 5 and 6, I believe these two chapters had a great influence on the emergence of Descartes' coordinate system, the calculus of Newton and Leibniz, Kant's antinomies, Hegel's dialectics, and Schelling's natural theology.

From the perspective of my research on the cosmic origin, only light and absolute zero are eternal infinities — without motion yet with intangible yin–yang transformation — serving as the origin of creation, motion, and change for all existence. Every stage of existence has limits to its changes; matter has relativistic change, and material energy also has relativistic change; all require a zero-coordinate system for form and process.

With the knowledge and information available in Aristotle's era, it was impossible to clearly articulate motion and change. Two thousand years from now, our descendants may still mock our ignorance. Nevertheless, Aristotle's rigorous logical analysis is worth studying.

Chapter 7 discussed The Origin of Motion and Change — Mover and Moved

Section 1 states that whatever is moved is moved by something (pp. 189–192). Section 2 holds that mover and moved are together (pp. 193–196). Section 3 maintains that all qualitative change belongs to perceptible qualities (pp. 197–199). Section 4 studies proportionality in motion (pp. 200–205). Section 5 examines the proportion of motion per unit time (pp. 206–208).

Section 1 studies the relationship between mover and moved, concluding that there must necessarily be a first mover. Section 2 studies the yin–yang unity of mover and moved, concluding that this unity proves the perceptual relationship between existences. Section 3 studies that all qualitative change belongs to perceptible qualities; Aristotle was not a practitioner of cultivation, and the perception mentioned here is a logical inference he reached through the philosophy of matter. I interpret Aristotle's description of perception as referring both to human perception and to an innate faculty possessed by "existence." Sections 4 and 5 deal with proportionality in motion and proportion per unit time — essentially the same issue. From the perspective of the philosophy of the cosmic origin, I understand that in human language, writing, and numerical description, motion and change are always relative; however, the property of existence itself is that motion and change are the universe's nature.

Chapter 8 discussed The First Mover and the First Moving Force

Section 1 concludes that motion has always existed and will always exist (pp. 209–214). Section 2 refutes the denial of the eternity of motion (pp. 215–216). Section 3 acknowledges the existence of

things that are sometimes in motion and sometimes at rest (pp. 217–220). Section 4 holds that anything moving is moved by another (pp. 221–225). Section 5 states that the first mover is not moved by anything else (pp. 226–234). Section 6 affirms that the unmoved first mover is eternal and unique (pp. 235–239). Section 7 states that locomotion is the primary and fundamental motion (pp. 240–243). Section 8 says that small circular motion can be continuous and unlimited (pp. 244–254). Section 9 asserts that circular motion is the fundamental primary locomotion (pp. 255–257). Section 10 says that the first mover has no parts or magnitude and is located on the spherical surface of the world (pp. 258–263).

This chapter's logical analysis of the first mover influenced not only the philosophy of the "God of Nature" but also the theology of a personalized God. From the perspective of modern physics' conclusions on the cosmic origin, the first mover is "force" and "the perception of existence" (Samo Liu, 2024i) — it is the information of the universe, akin to the philosophical concept in the *Zhuangzi*: "有长而无乎本剽者宙也。" Using the thought of the cosmic origin to revise Aristotle's philosophy of matter, the "first mover" is the mechanics of physics and the mutual self-perception between existences.

The "mover located on the spherical surface of the world" is purely a concept of the philosophy of matter. The origin of the universe contains no matter — it is the yin–yang dualized natural existence of absolute zero and absolute space, the light of philosophy, theology, and physics.

The universe is the living *Wu Ji* 无极(Limitless) and *Tai Ji*太极 , the *Qian–Kun*乾坤 (Heaven–Earth) existence of yin–yang in constant transformation. The origin is "emptiness" and "nothingness," it is light and absolute zero.

From the above discussion, it is clear that Aristotle's logical analysis gave rise to the philosophical reflection of the "God of Nature" and to the theological thought of a personalized God, and was a forerunner to modern scientific–philosophical thought. The next article will study his *Metaphysics*.

2.3. Newton's Theory of Motion and the "Material Existence" Doctrine

Newton was the discoverer and demonstrator of "material existence." His *Mathematical Principles of Natural Philosophy* (Newton, 2017) is renowned worldwide. By means of the universal law of gravitation (formula omitted, as it is well known), he demonstrated that gravitation in the universe depends solely on the mass and position of "matter" and "material energy." Without mass, there is no gravitation, because without mass and position there can be no perception between masses.

Newton's study of motion dealt exclusively with the motion of matter. There is no indication that he studied the "change" of "existence," nor that he examined the "perception" of matter and existence. His determination of the "first force" was that "God gave it a push." My own analysis of this "divine push" is that it is the perception of existence itself and the mutual perception between existences.

From the standpoint of the philosophy of cosmic origin, I regard Newton as both a rational-thinking scientist and a concentrated, sensorial-thinking philosopher.

He proposed the concept of absolute space — a concept supplemented in proof by his opponent Leibniz, and later criticized by Mach, who argued that Newton's example for proving absolute space was inappropriate. Nevertheless, Newton's profound philosophical concept of absolute space laid the groundwork for resolving philosophical contradictions in modern physics.
When Einstein extended Newton's concept of motion to its limit through light and the speed of light, the great law of mass–energy equivalence emerged. The existence, motion, and change of matter in space is, in the time process, the relativistic change of motion.

Newton also proposed the concept of absolute time, though still from the perspective of the philosophy of matter; he did not investigate the "origin of time."

The above understanding of the philosophical thought of Aristotle and Newton is based on the new perspective provided by the philosophy of the cosmic origin (Samo Liu, 2025f), and forms the basis for the exposition of various "relativities" in mechanics, as presented below for academic discussion and critique.

2.4. The Relativity of "Energy Existence" in Quantum Mechanics

Relativity, analyzed from the perspective of the philosophy of the cosmic origin, is the theory of the relativity of the process by which "existence" exists, moves, and changes in space. It should be understood as the phenomenon of the universe's "absolute existence" in space — and as the origin of that phenomenon — showing that the universe is a living existence.

When special relativity expresses the equivalence of matter and energy through the square of the speed of light and mass (formula omitted, as it is well known), quantum mechanics, conversely, scientifically proves that under the causal conditions of information, energy can give rise to matter. This is the relativity of mutual transformation between energy and matter. By the same logic, the strong and weak forces are the "energy existence" relativity in the creation theory of the material universe — whereby fermions, under the causal conditions of bosons, form matter.

This relativity can be expressed in terms of Einstein's speed of light and subluminal speeds; the speed of light is already infinite in this framework, with nothing exceeding it. It can also be described through the thermodynamic principles of motion, change, and equilibrium, or through the yin–yang structural model of electromagnetics. What it expresses is the relative description of the absolute change of "energy existence" — the expression of the living existence of yin–yang energy.

From the standpoint of the philosophy of cosmic origin, the theory that the strong force gathers energy into matter is the reverse relativity of special relativity, and is equivalent at the level of origin. By the same logic, if the speed of light is the limit for the motion and change of "mass" in material existence, then Planck's law (describing the relationship between blackbody radiation energy distribution and frequency or wavelength), the Planck constant (~6.6260693(11) × 10^-34 J·s), the Planck length (~1.6 × 10^-35 m), the Planck temperature (~1.4 × 10^32 K), and the Planck density (~5.2 × 10^96 kg/m³), taken together, can serve as the limits of change for energy and mass. In form, one might draw on the non-material philosophical concepts of M-theory's points, strings, and membranes to seek the formation of "material mass" nodes — not necessarily called the "God particle," but rather understood as the mutual perception and interaction between particles via the strong and weak forces.

The weak force, like the strong force, should also be understood as the mutual perception and interaction of particles condensing into "material mass." Its decay properties bring about the relativity of the endowment of existence and change in matter. The bosons of the weak force should not possess mass; otherwise, they would lose the informational characteristic of force.

If classical mechanics and special relativity describe the relativity of "matter" as a living existence moving in space and time, then quantum mechanics is the analogous relativity describing "energy" as a living and changing existence in space and time. I submit this interpretation for academic discussion.

2.5. Lord Kelvin's Absolute Zero "Motion and Change" Relativity

In physics, the Kelvin temperature scale (K) is defined as the thermodynamic scale with absolute zero as its zero point. This temperature is an idealized state in which the kinetic energy of molecules and

atoms within matter is reduced to its minimum, yet the quantum mechanical zero-point energy of particles still exists. Thus, molecules never become completely motionless. Absolute zero corresponds to −273.15 °C on the Celsius scale.

This is the physical description arising from the philosophy of matter, and science has already acknowledged that energy can possess zero-point energy. Quanta or particles of energy are in constant change and motion, and therefore should have a coordinate system and process baseline with zero as its origin. In my published work, I have used the logic of the cosmic origin to establish an energy coordinate system with absolute zero as the zero baseline, proposing that energy is a thermodynamic existence of yin–yang life based on the cosmic origin, serving as the yin–yang carrier of mechanical information (Samo Liu, 2025c).

It is often described that, near absolute zero, the thermal de Broglie wavelength becomes very long, and there is significant overlap between the matter waves of particles. Analysed through the logic of the cosmic origin, such energy may be a form of light or electromagnetic wave — a non-material existence that could correspond to zero dimensions and absolute zero. Under the informational action of mechanics, it may take the form of non-material points, strings, or membranes. The academic community might well employ the non-material philosophical concepts of M-theory's points, strings, and membranes to refine thinking about how energy gives rise to matter. Under what conditions does light become photons? Under what conditions can photons transform into the yin–yang states of electrons and positrons? And under what conditions do they exist as points, strings, and membranes? Under what conditions can they form three-dimensional "mass"? I invite scholars to ponder these intriguing questions through a synthesis of material philosophy and the philosophy of the cosmic origin.

It is also often described that absolute zero is obtained by extrapolation from the laws governing ideal gases: at absolute zero, the volume or pressure of a gas would drop to zero. In reality, all gases exhibit pronounced quantum properties as the temperature approaches absolute zero, and the motion of gas molecules no longer follows the statistical laws of classical thermodynamics. As absolute zero is approached, the kinetic energy of molecules tends toward a fixed value — the extreme value called zero-point energy. At this point, all particles occupy the lowest possible energy state, known as the ground state.

The academic community should reflect on the origins of the concepts of extreme value, zero-point energy, and ground state.

From the perspective of the cosmic origin, these concepts describe a zero ground state — infinite in nature — that has no structural form, cannot be described by a state of motion, and cannot be described by the process of time.

Lord Kelvin's theory of absolute zero is, in essence, the "motion and change" relativity of the cosmic origin.

2.6. Planck Parameters and the "Motion and Change" Relativity

If absolute zero represents the lowest limit of the motion and change of "matter and existence" — the origin of matter and existence- then quantum mechanics describes the form and process of the motion and change of "energy existence."

Classical mechanics and Einstein's relativity describe the relative processes expressed through the motion and change speeds of matter, and the limits of the speed of motion and change for three-dimensional "mass" forms.

Applying the same logic of the cosmic origin, all the Planck parameters in quantum mechanics — Planck's law (describing the relationship between blackbody radiation energy distribution and frequency or wavelength), the Planck constant (~6.6260693(11) × 10^−34 J·s), the Planck length (~1.6 × 10^−35 m), the Planck temperature (~1.4 × 10^32 K), the Planck density (~5.2 × 10^96 kg/m³), and so on — can all be considered the extreme limits of the motion and change of "matter and energy existence." Planck's theory thus makes him the creator of the thermodynamic "motion and change relativity" of the cosmic origin.

Planck's relativity and Kelvin's absolute zero relativity are, in physical terms, equivalent.They discovered the limits of "matter" and "existence," scientifically resolving humanity's ignorance regarding "infinite" knowledge.

2.7. Maxwell's Electromagnetic "Structural Change" Relativity

Electromagnetic mechanics, though generated under the guidance of the philosophy of matter as a branch of classical mechanics, reflects the yin–yang, positive–negative pole, and charge-based mutual perception of the "structure of matter and existence" in the universe.

Electromagnetic force depends solely on the existence and position of charges and poles, as well as the magnitude of the charges. Without the positional structure of yin–yang and the magnitude of charge, there is no mutual perception between them (formula omitted, as it is well known). It is independent of material mass, although mass can be converted into electrical energy, thermal energy, and kinetic energy.

When the great physicist Maxwell connected electromagnetism with electromagnetic fields, electromagnetic waves, and light waves, a physical system of cosmic origin — akin to the thermodynamic system — came into being.

If Newton was the physicist of "material motion." then Maxwell was the great physicist of the motion and change of "matter and existence." Electromagnetic mechanics applies equally to material and non-material energy. The "discontinuous" energy described by Planck may correspond to "material" energy, while continuous energy may correspond to the energy of the cosmic origin, which is governed by the information of the cosmic origin. "Nature" itself is the living structural form of yin–yang阴阳。

Later, in quantum mechanics research, physicist Dirac discovered the relationship between photons and electrons/positrons, providing further proof that light is the origin of the universe's yin–yang阴阳 structure. It is said that Dirac had a keen interest in the *Taiji* diagram太极图; through science, he demonstrated the positive–negative, yin–yang relationship of photons, light, and the speed of light, proving the infinite form of the universe's "yin–yang wuji阴阳无极" (limitless yin–yang). Conversely, he also proved the "yin–yang taiji阴阳太极" transformation of light, the speed of light, and photons.

By this logic, light and the speed of light are the origin of photons, electrons, and positrons; photons are the origin of particles; and particles are the origin of material mass. At present, we still do not know the logical relationship between dark matter, dark energy, light, and photons — this may well be the next breakthrough for quantum mechanics (Samo Liu, 2025b).

Electromagnetic mechanics has already developed into the study of the yin–yang structure of the universe and its cosmic origin. It is, in itself, the theory of relativity of the mutual perception of the structural form of "matter and existence" in the universe, with the light as the medium of change.

III. SPEED OF LIGHT AND VELOCITY — EINSTEIN'S "MATTER–ENERGY TRANSFORMATION" RELATIVITY

From the above discussions and analyses, we can see that Newton used the mathematical formula of universal gravitation to express the mutual perception of mass between material bodies. In the macroscopic world, these bodies move and change in accordance with the thermodynamic principle of *entropy*.

Einstein, by introducing the concept of the speed of light and light itself, revealed the equivalence of material mass and energy, and clearly demonstrated the ultimate state of motion for matter, as well as the existence of "matter–energy transformation." In his view, both the process and the ultimate limit of matter's motion and change are energy.

Through the philosophy of matter and a theory of relativity describing the change of matter in time and space, Einstein depicted a living, ever-changing universe. This great theory articulated the mutual transformation between matter and energy, and — at the pinnacle of physics — inspired humanity to re-examine the cosmic origin of the forms and processes of existence in space and time (Samo Liu, 2025a).

This is my comprehensive interpretation of Einstein's relativity from the perspective of the philosophy of the cosmic origin. It is also my reading of Lord Kelvin's absolute zero relativity and, indeed, of all the mechanics above as theories of the relative motion and change of existence within space. Humanity has discovered cosmic truths through physics, but when such matters are considered purely through the logic of material philosophy, contradictions arise. By thinking about these problems from the standpoint of the cosmic origin, new paths may emerge.

The above viewpoints are submitted to the academic community for discussion, critique, and verification.

IV. RELATIVE MOTION AND RELATIVE CHANGE, ABSOLUTE MOTION AND ABSOLUTE CHANGE

Truth is the natural reality of existence and change in the universe. It requires no human description; yet, for the sake of survival and existence, and equipped with the capacity for thought and logic, humans have created tools of information — language, script, and numbers — to describe it. Striving to explore the reality of existence in the universe through science, mathematics, and coordinate systems, we have created knowledge and information.

Humanity uses knowledge and information to study and verify the existence, change, and origin of the universe. The principle of the cosmic origin tells us that the existence of the universe is an objective natural reality, independent of human will — it is alive, and in the course of time it changes in certain spatial forms.

At a given instant, this existence may be considered apart from time, as a structural form characterised by structural density and arrangement. This is the foundation of classical physics — a static physics — yet one of great utility, facilitating the study of physical science.

When Einstein studied physics through "four-dimensional spacetime," he was not exploring a higher dimension of space and time, but rather applying physics to treat existence in the universe as a living subject of study — existence that is alive — thus linking with the cosmic origin philosophy of Daoist and Buddhist thought, and reactivating the cosmic origin philosophy of ancient Greece.

From this perspective, dark energy and dark matter, particles and quarks, molecules and atoms, cells and human cells can all be studied as living, changing existences in the universe. Each can be assigned its own zero-baseline coordinate system for spatial form and temporal process, forming a complete philosophical inquiry into the cosmic origin.

Thus, Einstein's invention of relativity makes it logically possible to infer that thermodynamics, electromagnetism, and the strong and weak nuclear forces are also kinds of relativity. Therefore, the natural essence of space and the existence within it is one of absolute motion and absolute change, as well as relative motion and relative change.

To study such existence, motion, and change, humanity must employ language, script, numbers, science, mathematics, and coordinate systems to understand that the relative motion and relative change of existence reflect the fact that the cosmic origin itself is one of absolute motion and absolute change.

The prerequisite is to understand the origin of space and time. This is the new inspiration that the great theory of relativity brings to human knowledge and information.

IIV. CONCLUSION

Inspired by modern scientific knowledge and information, I have written several books and articles on the philosophical system of the cosmic origin as a new scientific philosophical thought. The logic of this line of inquiry is becoming ever clearer.

Such work requires the broad participation of the academic community, and validation and refinement through the attitude of scientific philosophy.

This article studies form and change, discussing motion, velocity, and the speed of light within the framework of physics and thermodynamics. It supplements the logical gaps in Aristotle's *Physics* that arose from the absence of knowledge and information at the time, and it is my hope that the academic community will pay attention to and debate these ideas.

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In accordance with publishing policy and ethical standards, the data and concepts presented herein are public, in support of open knowledge sharing.

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速度与光速，密度，变化和绝对零度 --宇宙本原哲学原理的运动与变化

Samo Liu

文章摘要

速度是物理学或社会学中描述物质运动与变化的术语，指单位时间内物质移动的距离及其结构形态随时间推移的变化速率。作为三维空间坐标系的组成部分，它与时空紧密相关，是人类构建的物理知识体系。这种概念如同给时空赋予了实体形态（拟物质化），既是研究物理学、物质运动与变化的必要条件，也是物质哲学的重要研究单元，更是宇宙本原哲学中的关键参考指标。

位置和结构的存在与变化是物质哲学和物理学的必要指标，也是宇宙本原哲学中的因果逻辑参考指标。

密度是物质或能量在三维空间中存在时的物理单位—即单位体积内物质－能量－存在的总量。它与三维空间坐标系相关联，描述了空间的结构形态及其中的存在状态。作为人类通过“拟物质化”空间创造的知识体系，密度不仅是研究物理学和物质存在的必要条件，也是物质哲学的重要指标，更是宇宙本原哲学的关键参照。该概念与时间无关，仅描述存在的结构形态。

光速与绝对零度是物理学中发现的理论极限—这些单位存在于爱因斯坦的相对论、开尔文的“绝对零度理论”，以及光学、电磁学、量子力学和热力学等领域（*Samo Liu,2024i*）。它们是宇宙本原哲学研究中重要的知识体系。

本文章诠释亚里士多德《物理学》并推论诸力学均可以是表达“存在”的相对论。

关键词：运动、变化和速度；密度、结构和存在；光速和绝对零度；物质和非物质；存在的感知；《物理学》。

I. .文献综述

在科学哲学史上，牛顿和莱布尼茨—这两位认真思考过空间与时间概念及本原的科学哲学家—曾就绝对空间的概念展开过争论，他们的辩论被记录在著名的《莱布尼茨-克拉克通信》中。

牛顿提出了绝对空间的概念，莱布尼茨从捍卫上帝的角度对此提出反对；颇具讽刺意味的是，莱布尼茨最终却证明了绝对空间的概念（莱布尼茨，1996；Samo Liu,2021c）。在《莱布尼茨-克拉克通信》中，克拉克以多种方式描述了绝对空间—“超世界空间”“无物体的空间”“作为属性而非实体的空间”等等。

莱布尼茨仅用一句话就从科学上证明了绝对空间的存在：“让我向你们展示我是如何证明它的—空间是绝对均匀的东西；如果没有物体放置其中，空间中的一个点将与另一个点完全无法区分”（莱布尼茨，1996，p18）。

长期以来，学界一直认为莱布尼茨反对绝对空间，但仔细阅读他的著作就会发现，他并没有否认绝对空间。相反，他与牛顿和克拉克就绝对空间是什么进行了辩论，在此过程中，他补充了牛顿不完整的论述，甚至证明了它的存在。

没有物质，就没有位置或距离供物质存在，没有时间过程或结构形式的存在，自然也就没有物质运动的速度。这是宇宙本原的基本原理，在牛顿与莱布尼茨的辩论中得到了体现。

在牛顿与莱布尼茨的时代，电磁学、热力学、相对论和量子力学尚未问世。当时人们仅从物质的角度理解神的创造行为，那么物质被创造时的“神性”究竟何在？他们既缺乏知识也无从解答。莱布尼茨从神学

角度提出：上帝存在于没有物质、没有物理距离、没有物理时间的地方。由于这种神圣本质尚不可知，他告诫世人切莫轻率揣测。可惜这场哲学辩论未竟，莱布尼茨便溘然长逝，将这些思考留给了后世。

爱因斯坦的相对论揭示，物质由光的“神性”与光速构成的。该理论还阐明：物质—乃至所有存在—都以特定的“密度”结构形式存在于时间之中，并以“速度”为名进行运动与变化，其终极极限正是光速—这是物理学的真理。爱因斯坦的核心观点并非关于“时空倒转”，而是探讨存在形态与过程在时空中的演变规律。这一深刻洞见促使我们重新审视“时空”概念及其本原（Samo Liu,2025g）。

量子力学告诉我们，物质是由夸克、费米子和玻色子这些粒子的“神性”构成的—这种神性已经得到了科学的证实。它还告诉我们，这种神性在创造物质时具有波粒二象性、不确定性以及纠缠现象。

我们还不知道是什么样的“神性”创造了粒子和夸克，但物理学已经发现了暗物质和暗能量—这些存在形式符合热力学原理，而且不是绝对零度。

开尔文勋爵提出的“绝对零度理论”指出，物质与存在的一切变化都会停止的最低温度就是绝对零度（0 K，−273.15°C）。在这个状态下，密度和速度不复存在—这是物质与存在运动变化的最小极限。后来普朗克温度为物质运动变化设定了上限——宇宙最高温度1.4×10^{32}°C，此时粒子能量接近普朗克能 $(2\times10^{9}J)$，对应的波长会缩小到普朗克长度$(1.6\times10^{-35}m)$。

按照同样的逻辑，光速是物质运动的上限，而零速度和零变化对应着下限—绝对零度。

宇宙本原的原理告诉我们：热量并非一种自然力，而是人类创造的物理概念—这种被“人类”“物质”和“存在”感知与体悟的存在，体现了“存在”的运动、变化和平衡。绝对零度、普朗克温度和光速在本质上具有同源性—它们分别代表存在的“零”与“无限”（Samo Liu,2024i）—这一命题值得学术界深入探讨与验证。

人类还发现了电磁学原理，揭示出所有物质和存在都有阴阳结构状态的结构形式。电磁波是光波，在光速下所有的能量都可以用电磁能和热能来表示。

例如，没有物质或物质能量的空间—“无极”（无限和元一）—是一种阴阳二元状态，充满生机，可以称为电磁（阴阳）状态。在力学的神圣影响下，宇宙进入“太极”阴阳形式的“能量化的物质”和“物质化的能量”的阶段，仍然是一个充满活力的电磁（阴阳）结构。

科学界发现了诸如大爆炸理论和黑洞等理论，这些理论都指向一个“神性”的存在—它创造了宇宙中的“无极”与“太极”，并生成了已知存在的知识与信息。无论采用何种逻辑框架，这种“神性”都能通过“物理力学”来表达。这类力学原理正是万物感知与生命宇宙的阴阳法则—存在具有感知能力，而力学则是宇宙的神学（Samo Liu,2024i；2024h；2024g）。

这一原理通过辩证唯物主义的视角，可在道家哲学、佛家哲学以及古希腊关于宇宙本原的哲学思想中找到逻辑依据。人类在宇宙本原理论与物质哲学领域所创造的知识体系，已然形成一个自洽完整的理论框架。笔者已就此撰写多篇论文，并诚邀学术界共同探讨（Samo Liu, 2025f）。

马赫是位杰出的物理学家。他通过指出牛顿绝对空间理论的漏洞，成功驳斥了其论证，并对绝对空间概念提出质疑。尽管马赫的反对意见有理有据，但终究无法证明牛顿的绝对空间理论存在谬误。牛顿运用物质哲学中的（数学的）物理原理，论证了若空间脱离物质存在必然导致矛盾—莱布尼茨已经证明过这一点，莱布尼茨对绝对空间的论证并没有解决马赫的反对意见。

马赫撰写了《力学及其发展的批判历史概论》（恩斯特·马赫，2014）。通过研究这部著作可以发现，他是一位数学形式主义者，以机械论视角看待宇宙，将物质和存在视为一种“无生命的存在”。作为坚定的唯物主义者，没有证据表明他曾探索或研究过空间与时间的概念及本原。不过，他的思想对爱因斯坦产生了影响。

出于某种不明原因，学术界逐渐认为绝对空间理论已被证伪。这种转变的深层根源可能源于后亚里士多德哲学时期—当时宇宙被“假定”为物质实体，没有物质的空间概念难以想象。然而热力学、相对论和

量子力学的突破性成果，迫使人类开始构想无物质的时空形态，以此来探索宇宙与人类本原的奥秘（Liu Hongjun & Samo Liu，2020；2021a）。

从速度和光速、密度、绝对零度的两种“相对性”以及电磁学、强力和弱力的“相对性”等角度出发，探讨了宇宙本原运动和变化的基本原理。

本文重点探讨牛顿、莱布尼茨的科学哲学思想以及亚里士多德《物理学》的理论体系，其哲学基础融合了道家、佛家、古希腊哲学关于宇宙本原的思考，并结合辩证唯物主义与现代科学哲学；科学知识来源则取自现代物理学、现代科学及矿物加工领域。

II. 讨论

速度与密度是本文研究的主要对象，它们代表物质、能量和一切存在的形式与过程，反映了“存在”在它的存在过程中，无论在形式上还是在位置上，都存在着变化和运动。

变化是存在的主题，它象征着存在过程中生命的现象和感知的先天能力；运动是物质变化的一种客观形式。

“变化性存在”属于阳的范畴；在物理学中，它被描述为物质与能量，包括物理学发现的暗物质和暗能量等可能存在形式。阳的存在之变源于阴的“力学神性”—一种因果制约的治理形态—这种机制被称为信息（Samo Liu，2024a；2024b）。

力学是存在过程中“感知”与“被感知”的相互关系。这种“过程”通过人类的语言、文字、数字以及太阳系的自然现象来描绘，被称为“时间单位”。时间可能是存在感知力学的过程；所有力学都可以用热力学来描述（Samo Liu，2025c）。

人类将存在的形式描述为空间形式—例如，物质世界是三维空间，而非物质世界可能是零维或非三维的（Samo Liu，2021a；2021b；2021c）。

速度，用传统说法，是单位时间内物体位置/距离和结构形式的变化。这是物理学必须采用的表达方式—但它忽略了很多东西。

举个例子，在宏观层面，我们往往忽略物质作为质量的能量状态在运动过程中始终处于变化之中。在微观层面，我们把物质的存在视为毫无生气的固定存在，而实际上这种“物质存在”在微观热力学时间的感知过程中不断变化。这种变化并非纯粹的物理概念，而是“物理－化学”概念—它源自宇宙本质，并体现了“相对性原理”。

密度是单位空间内物质与能量的总量。这个单位不涉及时间维度，因此可以忽略时间因素。我们或许会将这种物质与能量的结构形态视为瞬时存在或固定状态—一种“无生命”的存在形式。然而这种理论形态虽可被视作真实存在，但现实中它始终遵循着“绝对变化的相对性”这一基本原理。

在物理学中，有一个衡量时间变化的重要单位—数学单位Δt。我们使用传统的计时单位—年、月、日、小时、分钟、秒—来比较过程的持续时间。然而，如果用普朗克时间来观察，这种时间描述会变得极其庞大；而用宇宙时间单位“卡尔帕”来观察，时间则显得极其短暂。

同样，对于长度，我们通常用米、分米、厘米和毫米来比较ΔL。在普朗克尺度上观察到的这些数字是巨大的；在光年或秒差距等宇宙长度单位上观察到的，它们是微小的。

这些过程的持续时间以及长度的大小在存在的每个阶段都是不断变化的，因此在每个阶段都必须建立一个零坐标系来比较相对的变化，在各种坐标系中，形式和过程的变化都有开始和结束。

它们的起源在光与绝对零度，它们的最终归宿也在光与绝对零度。宇宙中所有“变化的存在”—不论是暗能量、暗物质、粒子、夸克、分子、原子、物质，甚至人类—都具有相同的概念和宇宙本原的基本原理。

接下来，我们将根据科学哲学的辩证唯物主义原则，对牛顿、亚里士多德关于这些问题的讨论进行反思，重新审视各种力学的相对性，并结合佛教哲学、道教哲学和古希腊哲学中关于宇宙本原的思想来讨论这些问题。

2.1. 讨论*1*：存在、感知和感觉

感觉问题不在本文讨论之列，感觉是人类与生俱来的天赋能力，实际上，它是细胞物质所普遍具有的自然禀赋。

然而，感知问题是一个学术界应该高度重视和认真讨论的问题。

从人类的视角来看，讨论自我感知的问题可以从佛家、道家的宇宙本原思想中找到系统的方法和答案，同样，也可以用不同民族、不同国家的传统医学、养生实践来讨论人类的自我认知，比如中国的传统医学、气功。

环境越安静，人就越容易接触到人类的自我感知，人的感觉会影响人的知觉，即使是没有感觉的普通物质，不论是物质形态还是能量形态，都有其自身存在的感知。

对存在的认知，可以通过“存在”本身的存续、存在的运动与变化，以及存在的过程来验证。无论是零维、非三维还是三维的存在形态，其存在过程都可能被视作对各种力量的全面感知，最终反映出所有存在形式所蕴含的热力学平衡与循环往复。

这种“存在”，无论是暗物质、暗能量、粒子和夸克、分子和原子，还是细胞和人类细胞，乃至星球、星系，都是物质和物质能量的总体，对各种“力”做出反应，并在感知中发生变化。

引力是具有“质量”的物质或物质能量之间的相互作用。这种作用形成了宇宙中的超星系团、星系团和星系，孕育了银河系与太阳系。人类先祖正是利用这些天体系统的运动规律与稳定特性，制定了由年、月、日、时、分、秒构成的计时体系。而具有“质量”的物质或物质能量的产生、存在、运动与变化，本质上都是热力学运动、状态变化与平衡过程的体现。

引力的存在必须依托于“质量”。物质的最高运动速度是光速，最高热能是普朗克温度，而最低热能则是绝对零度。超出这个范围后，引力便不复存在—因为此时“质量”已不复存在，物质间的相互作用也就无从谈起（Samo Liu，2024i）。

电磁学是物质或物质能量阴阳结构之间的感知机制。它与物质质量无关，但取决于存在结构的电性质、电荷的极性及其分布位置。阴阳结构感知的媒介是光波。无论是物质存在还是非物质存在都具备这种禀赋，其运作遵循热力学原理，正是这种力量驱动着物质的创造、存在、变化、相互排斥与相互生成（Samo Liu，2024i）。

强相互作用与弱相互作用是粒子与夸克之间的结构性认知。这种认知既赋予物质“质量”的凝聚特性，又实现了放射性衰变中阴阳二元的双重功能。在物质“质量”的形成过程中，它们展现出波粒二象性、不确定性及量子纠缠现象，这些特征均符合热力学运动、变化与平衡的基本原理。其创生与存在可能呈现非物质化的零维形态、“非物质化”的一维线状结构、二维膜状结构，或具有三维物质形态（参见M理论）。是否构成原子“质量”取决于热力学原理以及粒子与夸克间阴阳“因果”认知的差异。描述其形态可采用普朗克长度（Samo Liu，2024i），而描述其过程则需借助普朗克时间。

暗物质和暗能量的形式和过程目前尚不清楚，需要在量子力学中进行进一步的理论和实验研究。然而，它们的原则应该符合宇宙本原的热力学原理—也许它们本身就是热力学原理本身。

热力学是关于宇宙中所有存在的产生、存在、变化、平衡和循环的全面描述；它是宇宙本原的基本原理。

通过对宇宙中“存在”现象的感知进行深入探讨与分析，我们可以得出这样的结论：爱因斯坦的相对论并非描述时空的弯曲，而是揭示了物质质量在时空中的“相对”运动与变化—特别是物质质量这种“存在”在

时空中的动态呈现。该理论同样阐释了热力学意义上的“绝对存在”与“绝对变化”，既涵盖物质世界的存在本质，也涉及非物质世界的运行规律。

因此，爱因斯坦的质量-运动相对论和开尔文-普朗克热力学相对论是宇宙中存在运动和变化的两个基本相对论（Samo Liu，2024i）。

按照这个逻辑，电磁学、强相互作用和弱相互作用也应该有它们自己的物理“相对性原理”。

2.2.亚里士多德的《物理学》（*Aristotle，2019*）

《物理学》中文版存在多个版本，共八章。本文引用其中一个版本（Aristotle，2019）。

亚里士多德的《物理学》是一部研究事物本原、因和因素的著作。

在第一章第一节（亚里士多德，2019， p1）中，他提出理解自然事物的关键在于研究和理解其本原、因和原理。

第二节（p2）探讨了本原问题。显然，亚里士多德并未研究佛教和道教哲学中系统化的宇宙本原理论，而是分析了古希腊哲学家关于本原的观点片段—例如“存在”“太一”以及“万物一体”等议题。鉴于当时所掌握的知识与信息有限，亚里士多德未能对这些命题进行清晰地阐释。

在第三节（p.7）中，亚里士多德运用逻辑批判性地评价了古希腊宇宙本原的观点，分析并批判了“一”或“存在”作为宇宙本原的观点。

在缺乏现代物理学、量子力学、相对论或热力学等科学知识的背景下，亚里士多德在第四节（pp.11-14）中逐一批判性地审视了古希腊哲学关于宇宙本原的观点，例如“一与多”的问题，最终倾向于恩培多克勒的思想。值得注意的是，在那个时代，零的概念和位值体系尚未形成。

在第五节（pp.15-18），亚里士多德将古希腊哲学对宇宙本原的阐释总结为“对立”。显然，当时的古希腊哲学在某种程度上反映了《易经》中的阴阳思想。

第六、七节（pp.18-25）探讨了“一”与“二”的起源数量问题。此时，我联想到了《道德经》中的一句话：“一生二，二生三，三生万物”（不翻译）。

第八、九节（pp.25-29）运用物质哲学的逻辑思维，对古希腊哲学中关于“存在”与“非存在”的论述进行评析，强调逻辑分析在解决问题中的关键作用。文中重点提及若干核心概念：“变化”“对立”“物质”“剥夺”“形式”，以及具有里程碑意义的“第一哲学”研究任务。第一章实质上是亚里士多德对古希腊哲学家关于宇宙本原讨论的系统性总结与思想整合。

“第一哲学”是亚里士多德根据当时人类所掌握的关于“物质世界”的知识和信息发展起来的哲学方法。利用它来研究宇宙的本原，也用它引领了科学发展，我称之为“物质哲学”。第二章研究自然与变化（pp.30-55）

亚里士多德在《物理学》第二章第一节中指出，有些事物是自然存在的，而另一些则是由其他原因导致的。所有自然事物显然都内在地具有运动与静止的来源。“自然”是事物所属之物中运动与静止的固有根源和原因（pp.30-33）。

在对自然的辩证分析中，他指出许多事物显然存在，但有些人却试图用模糊概念来证明显而易见的事实—这暴露了他们无法区分不言自明与非自明之事。这种科学哲学辩证法是分析和观察事物的工具，也是物质哲学的起点与根基，揭示出人类知识与信息始终是阶段性相对真理。

第二节(pp.34-37)探讨了数学家、自然哲学家与唯心主义哲学家的研究差异。这种差异源于研究对象的不同:数学关注自然现象,而哲学则聚焦于抽象概念。若抛开自然界的真相或本质,无论是哲学家还是数学家都能随心所欲地构建理论框架——例如哲学中相对论的"四维时空"概念,以及M理论中的点弦膜"高维空间"模型。

第三至第六节探讨了"本因"(benyin)这一概念(pp.37-47),运用物质哲学的逻辑框架,深入剖析"生灭"与"自然变化"的根本原因。在研究"偶然性"与"自发性"时,第四节指出这些术语是玄学家和哲学家用来描述其认知体系的表述。第五节认为人类主观意识能够出于特定目的,对偶然性和自发性作出判断并形成理解。第六节最终得出核心结论:自发性和偶然性是人类反思自然结果的方式,其根源在于"本因"的不确定性(p.47)。

第7至9节(pp.48-55)对"第一因"　将对"第一因"的探讨延伸至对"四因"——质料因、形式因、动力因和目的因的逻辑分析。这种逻辑思维方法植根于物质哲学,同样适用于宇宙本原的哲学探讨。第8节提出了一个根本性问题:自然活动是否具有目的?最终论证表明,自然是自身的原因,且确实是终极原因。鉴于亚里士多德所处时代的知识局限,他无法清晰阐述"目的因"的本质;他并非修行观照的实践者,而是一位理性逻辑的思考者。

《道德经》将宇宙视为"无为而为"(wu wei er wei)。第38章指出,宇宙的"终极原因"在于阴阳平衡 (Liu Hongjun & Samo Liu, 2021d),这种平衡可以用热力学中的创生、运动、变化和平衡来描述 (Samo Liu, 2024i)。

在第九节(pp.53-55)中,亚里士多德运用物质哲学探讨自然物体与存在本质的必然性,提出了"质料因"和"质料本原"的概念。借助现代科学知识体系,我们可以将暗物质与暗能量、粒子与夸克、分子与原子、细胞与人类等现象,统一归入质料因与质料本原的范畴进行系统分类。(Samoliu, 2025g;2025h)

他的研究得出结论,这些存在是自然宇宙的必要组成部分。它们包括所谓的物质存在及其运动与变化。

他强调,目的才是物质存在的原因,而非物质是目的的原因。目的是为了某个事物而存在,而起点源于人类的定义(p.55)。因此,在我研究宇宙本原时我定义"起点"是形式和过程的零原点坐标系。

第三章研究运动和无限(*pp.56-80*)

第一节探讨了运动的本质(pp.56-57)。亚里士多德认为,自然规律是运动与变化的源泉。若没有空间、虚空和时间,运动便无从谈起;若没有物质存在,运动也就无从发生。亚里士多德运用物质哲学来研究运动现象。显然,莱布尼茨在论证绝对空间时的思维方式与此观点一脉相承。若没有量子力学、相对论和热力学的知识体系,我们根本无法完整理解空间的存在本质,更遑论把握其中蕴含的运动与变化规律。

他还认为,存在种类的数量与运动和变化的种类数量相对应(p.57)。他的研究得出了两个结论(第59页):

运动是"潜在存在"作为能够运动的事物的实现。如今的知识和信息使我们能够将"潜在存在"解释为物理学的力学—这是亚里士多德时代无法用知识解释的。

运动发生的时间正是势能实现其势能的时间,不早于势能,也不晚于势能。显然,亚里士多德研究的是时间现象,而不是时间的本原;古希腊哲学缺乏这方面的知识。

第二节继续运用物质的哲学来探讨运动的本质(pp.59-61),将运动与变化归为一类,并通过接触作用的概念进行分析,区分静止、运动者、被运动者和共同运动者。运动者是运动的本原或原因。

第三节探讨了推动者与被推动者的关联,指出运动发生在具有运动和变化能力的事物内部(*p.61*),推动者的实现活动体现在被推动者的实现活动中;两者的实现活动是统一的。作者进一步提出,推动者与被推动者都存在于被推动之中,或者说主动者存在于主动者内部,被动者存在于被动者内部。

作为物质哲学的奠基人，亚里士多德可能并未亲身体验过修炼之道，也未曾深入研究“感知”这一课题。但在我看来，从物质哲学的视角出发，他通过逻辑论证证明了“存在”的运动与变化本质上是相互感知的过程。在本节论述中，他运用物质哲学特有的逻辑语言，对这一观点进行了系统性地阐释。

值得注意的是，亚里士多德本人或许并未完全领会这一逻辑推导的重要性，因其著作中未对此结论进行详尽阐述。然而，任何力学公式或原理都没有偏离这一深刻的逻辑推理。

第*4-8*节讨论了无限

第四节探讨了早期哲学家对有限与无限的认知，指出研究自然哲学的学者都曾探讨过“无限”这一命题，其中多数人认为无限是万物的初始本原(p.64)。亚里士多德将早期哲学家的观点归纳为三类：

有像毕达哥拉斯这样的人，把“无限”放在可感知的事物之中。毫无疑问，这些人是修炼者，认为天外是无限的(p.64)。在我的著作中，我将这种观点归为无极(无限)的宇宙本原概念。

另一种类型将无限置于可感知和理性领域之中，例如柏拉图，他认为有两种无限：无限大和无限小(p.64)。在我的著作中，我将这种观点归类于物质本原的太极概念。

第三种观点认为“无限”是一种被称为元素的自然实体。在此观点下，存在两种看法：一种认为元素的数量是有限的；另一种则认为无限(pp.64-65)。他们还认为无限是神圣的，因为神圣的事物不会消亡(p.66)。

亚里士多德不情愿地指出：否认无限性会带来许多矛盾；承认无限性则需要回答它是否以实体存在，是作为某种事物的固有属性，还是两者兼而有之(p.67)。

通过这一部分的研究，我得出以下结论：(1) 亚里士多德并非修行实践者， 而是一位理性逻辑的思考 者；(2) 古希腊哲学对宇宙本原的研究缺乏系统性且零散，未能像东方哲学那样形成体系化框架，这使得亚里士多德在分析这些问题时面临困难。然而这并未阻碍他—他继续对上述观点进行了严谨的分析与批判。

第五节对毕达哥拉斯学派和柏拉图主义关于独立存在的无限概念进行了逻辑批判(pp.67-73)。第六节探讨了无限是否存在及其存在形式(pp.74-77)。第七节分析了古希腊哲学中关于无限的多种观点。第八节驳斥了关于实际无限存在的论证(pp.79-80)。

亚里士多德运用物质哲学的逻辑框架，深入探讨了无限存在的本质形态、非存在的维度以及其真实本质。这些关于物质哲学的逻辑推演，本质上是对宇宙本原的理性阐释。尽管当时的知识体系尚无法完全解释这些现象，但借助现代科学知识、物理学理论及前沿研究成果，我们如今已能清晰阐明其中奥妙。

我邀请物理、数学界的同仁们思考：当你们在实际工作中遇到零和无穷的问题时，不妨回顾一下亚里士多德对无穷的思考。

第*4*节讨论了空间、虚空和时间

这一节讨论空间、虚空和时间—人类哲学思想的基本问题，也是理解运动和变化的关键。

第一节探讨空间是否存在(pp.81-83)。第二节分析空间是形式还是物质(pp.84-85)。第三部分研究事物能否独立存在，以及空间是否存在于空间之中(pp.86-88)。第四部分探究空间的本质属性(pp.89-93)。第五部分对空间进行理论推演(pp.94-96)。

显然，亚里士多德是通过物质哲学来研究空间的。考虑到他所处时代的知识水平，他无法从非物质的角度来探究空间。关于空间中“存在”的“未知”状态，使他难以阐明宇宙本原与物质本原。不过，凭借物质哲学中的清晰逻辑，他还是阐述了几个关键观点：

每一个元素体(存在)都倾向于自己的特定空间(p.95)。
形式是事物的界限;空间是包围物体的界限(p.91)。
空间是一个静止的容器(p.93)。
我认为这些陈述是在物质哲学的框架内对宇宙本原空间的某些部分本质的逻辑推论。我将在另外的文章中以此论证"空间"的"本原""本体"属性。
第6-9节.空间

第六节探讨了其他学者对虚空的观点(pp.97-98)。第七节分析并讨论了虚空的定义(pp.99-101)。第八节探讨了未与物质分离的虚空现象(pp.102-107)。第九节研究了物体内部的虚空形态(pp.108-110)。

(pp.108-110)。

我认为亚里士多德所说的"虚空",指的是空间中的"非物质存在"。由于缺乏现代科学知识,又没有东方哲学系统化的认知体系,他很难通过物质哲学来研究虚空。古希腊有些哲学家承认虚空的存在,另一些则予以否定—这种立场差异导致他们在探讨宇宙本原时,研究结论出现了自相矛盾(pp.99)。

第七节的研究与思考值得当今学术界的关注。亚里士多德曾研究过空间中"虚无"的存在—具体而言,即空间内"非物质"的存在。他运用物质哲学的逻辑进行推演,认为要证明虚空存在的依据其实很容易被驳倒(p.101)。然而,亚里士多德并未轻易否定虚空的存在。

两千多年后,我们可以向亚里士多德保证,那里存在的就是"非物质"能量和信息的"物质"方面—物质的起源和归宿(Samo Liu, 2024i)。

第八节阐明,不存在与物体分离的虚空—这是分析空间与虚空时典型的物质哲学观点。若用现代知识和信息来批判亚里士多德有失公允,那么第八节的最后一句话便使他的解释自洽:因为这种"存在"可理解为物质与非物质的结合体,所以不存在与"存在"分离的虚空(Samo Liu, 2024i)。

第九章探讨了物体内部的虚空现象。这显然是将物质哲学应用于研究物质对象内部的虚空—本质上是对物质存在密度的讨论。现代物理学已颠覆了这种逻辑分析方式。虚空既存在于物体内部,也存在于外部。量子力学、相对论和宇宙学理论告诉我们,应当从能量与信息的角度重新思考宇宙与人类的本原。

第*10-14*节讨论时间

第十节探讨了关于时间存在性的疑问(pp.111-112)。第十一节提出核心问题:时间的本质是什么?(pp.113-117)第十二节系统研究了时间的多种特性;(pp.118-121)第十三节对多个与时间相关的术语进行了定义;(pp.122-124)第十四节则进一步阐述了关于时间的深层思考(pp.125-128)。

亚里士多德用物质的哲学来思考时间,这表明古希腊哲学缺乏对"时间本原"的研究。将时间视为"物质存在"导致了现代物理学中关于"时空弯曲"的哲学思路。

道家哲学将时间视为"存在过程",并借助太阳系的自然现象为其命名。《道德经》对此阐释为"道可道,非常道,名可名,非常名"和"常有欲以观其徼"(老子, 2019),表明存在的"本体"形态与过程具有有限性、界限性及始末特征。人类虽能用语言、文字和数字对其进行命名,但这种命名往往只捕捉到表象而非本质(Liu Hongjun & Samo Liu, 2021d)。

文子将时间的流逝称为"往古来今谓之宙"。《庄子》则将其表述为"有长而无乎本剽者宙也"(Samo Liu, 2024i)。《黄帝内经》认为人体细胞能够感知时间的流逝。在石质研究中,我认为物质与存在本身都能感知时间的流逝(Samo Liu, 2025d)。

佛家哲学将存在过程称为"度"(佛家对存在过程的表达),并将宇宙存在过程的基本单元定义为"劫"。其中一劫相当于梵天神的一日,相当于43.2亿个人类年。人类先祖在构思宇宙时间概念方面取得了非凡的创造性成就(Samo Liu, 2025c;Liu Hongjun & Samo Liu, 2024)。

人类创造日常时间单位，本质上是对物质存在过程的哲学性诠释。先祖们将地球绕太阳公转的周期命名为“年”，月球绕地球公转的周期称为“月”；一年约十二个月；地球自转称为“日”；一天分为十二个时辰和二十四单时；每小时划分为六十分钟，每分钟又细分为六十秒。这些固定的时间计量单位，是人类为测量生命进程而创造的信息工具，使我们得以量化物质运动的速度与变化（Samo Liu，2025c）。

量子力学引入了普朗克时间单位来描述粒子和夸克的存在过程。如果没有人类及其知识表达方式，宇宙将按照自身规律运行，完全不受人类认知的影响。只不过在这种情况下，宇宙将失去一种特定的信息表达工具。

因此，如果人类声称时间可以弯曲或逆转，这只能说明人类的思想已经弯曲了。只有一种可能性：人类和“存在”对自身存在过程的感知是自然的。

第五章讨论**了运**动**和**变**化的研究**

第一节对**运**动**与**变**化**进**行分**类（pp.129-132）。

第二节从“**本**质**属性**”**角度探**讨**运**动**的分**类（pp.133-136）。

第三节解析多个术语**的含**义“**共同**”“**分离**”“**接触**”“**间**接”“**连续连**接”“**连续**接触**”及**“**连续**性**”（pp.137-139）。**第第四节考察同**类**型与不同**类**型运**动**的差异**（pp.140-144）。

第五节分析运动间**的**对**立关系**（pp.145-146）。

第六节探讨**运**动**与静止的**对**立关系**（pp.147-152）。

本章研究物质和“存在”的禀赋和本质，以及存在的热力学性质—它的形式和过程，这是我的文章的主题。

第六章研究运动与变化的持续性

第1节和第2节探讨了每个连续统如何由连续可分的部分构成（pp.153-161）。第3节研究了时间瞬间的不可分割性，指出在某一时刻内没有任何事物能够移动或处于静止状态（pp.162-163）。第4节分析了任何运动物体都可被分割的特性（pp.164-167）。第5节指出，已发生的事物已然到达其终点（pp.168-171）。第6节认为，若某物在特定时间段内发生变化，则该变化贯穿整个时间段的每一部分（pp.172-174）。第7节讨论了运动幅度与推动者在有限性与无限性上的区别（pp.175-178）。第8节涉及趋向静止与静止本身的关系（pp.179-181）。第9节驳斥了否定运动可能性的论点（pp.182-184）。第10节明确指出无分体之物无法运动（pp.185-188）。

通过研究第五、六章，可以发现这两章对笛卡尔坐标系的建立、牛顿和莱布尼茨的微积分、康德的二律背反、黑格尔的辩证法以及谢林的自然神学都产生了深远的影响。

从我研究宇宙本原的角度来看，唯有光与绝对零度是永恒的无限—没有运动却蕴含着无形的阴阳转化—它们作为万物创造、运动与变化的源头。每个存在阶段的变化都有其局限性；物质有相对论性的变化，物质能量也有相对论性的变化；所有这些都需要一个以零为坐标系的形式和过程。

在亚里士多德所处的时代，人类已经掌握了各种知识和信息，但仍然无法清楚地阐明运动和变化的概念。两千年后，我们的子孙后代或许还会嘲笑我们的无知。但是，亚里士多德严谨的逻辑分析方法仍然值得我们研究。

第七章讨论了运动和变化的本原—运动者和被运动者

第一节指出，任何被移动的事物都必然由某种力量驱动(pp.189-192)。第二节强调，推动者与被推动者是相互依存的(pp.193-196)。第三节主张，所有质变都属于可感知的属性范畴(pp.197-199。第四节探讨运动中的比例关系(pp.200-205)。第五节则分析单位时间内运动的比例(pp.206-208)。

第一节探讨了运动者与被运动者之间的关系，最终得出必须存在第一运动的结论。第二节研究了运动者与被运动者阴阳相生的统一性，认为这种统一性证明了存在之间感知关系的存在。第三节指出所有质变都属于可感知的属性范畴;亚里士多德并非修行家，此处提到的感知是他通过物质哲学得出的逻辑推论。我认为亚里士多德对感知的描述既指人类感知，也指存在所固有的先天能力(理解这一点很重要)

第八章讨论了第一推动者和第一动力

第一节总结指出，运动自古有之且永存(pp.209-214)。第二节驳斥了否定运动永恒性的观点 (pp.215-216)。第三节承认存在时而运动、时而静止的事物(pp.217-220)。第四节主张任何运动皆由他物驱动(pp.221-225)。第五节阐明第一推动者不受其他事物影响(pp.226-234)。第六节确认无被动的第一推动者具有永恒性与唯一性(pp.235-239)。第七节强调运动是首要且根本的运动形式(pp.240-243)。第八节说明小范围的圆周运动可无限延续(pp.244-254)。第九节断言圆周运动是首要的运动基础 (pp.255-257)。第十节指出第-推动者无分量且无实体，仅存在于世界的球形表面pp.258-263)。

本章对第一推动者的逻辑分析不仅影响了“自然之神”的哲学体系，更深刻影响了 人格化上帝的神学理论。从现代物理学对宇宙本原的结论来看，第一推动者是“力”与“存在感知”(Samo Liu, 2024i)—它本质上是宇宙的信息载体，与《庄子》中的哲学概念“有长而无乎本剽者宙也”遥相呼应。 通过运用宇宙本原理论重构亚里士多德的物质哲学，我们发现“第一推动者”既包含物理学中的力学原理 ，又体现了不同存在体间的相互感知机制。

“位于世界球面的运动者”纯粹是物质哲学的一个概念。宇宙的本原并不包含任何物质—它是阴阳二元化的自然存在，具有绝对零度和绝对空间，是哲学、神学和物理学的光。

宇宙是生生不息的“无极”与“太极”，是阴阳相生相变的乾坤(天－地)存在。其本原是“空”与“无”，是光与绝对零度。

通过上述讨论可以清楚地看出，亚里士多德的逻辑分析催生了 “自然之神”的哲学思考和人格化上帝的神学思想，是现代科学哲学思想的先驱，下文将研究他的《形而上学》。

*2.3.*牛顿运动理论与“物质存在”学说

牛顿是“物质存在”概念的发现者与论证者。其著作《自然哲学的数学原理》(Newton, 2017)享誉全球。通过万有引力定律(公式略去，因其广为人知)， 他证明了宇宙中的引力仅取决于“物质”和“物质能量”的质量与位置。没有质量就不存在引力，因为若缺乏质量和空间定位，不同质量之间便无法产生相互作用。

牛顿对运动的研究仅限于物质的运动。没有迹象表明他研究过“存在”的“变化”，也没有考察物质与存在的“感知”。他对“第一推力”的认定是“上帝施加了推动之力”。而我对此“神圣推力”的分析认为，它本质上是对存在本身的感知，以及不同存在之间的相互感知。

从宇宙本原哲学的角度来看，我认为牛顿既是一个理性思考的科学家，也是一个专注、感性思考的哲学家。

他提出了绝对空间的概念，这个概念在证明中得到了他的对手莱布尼茨的补充，后来被马赫批评，他认为牛顿用来证明绝对空间的例子是不恰当的。尽管如此，牛顿关于绝对空间的深刻哲学概念为解决现代物理学中的哲学矛盾奠定了基础。

当爱因斯坦通过光和光速将牛顿的运动概念延伸到极限时，质量－能量等价的伟大定律就出现了。物质在空间中的存在、运动和变化，在时间过程中，就是相对论性的运动变化。

牛顿也提出了绝对时间的概念，尽管仍然从物质哲学的角度出发，他并没有研究“时间的本原”。

对亚里士多德和牛顿哲学思想的上述理解，是基于宇宙本原哲学（Samo Liu，2025f）提供的新视角，并为力学中各种“相对性”的阐释奠定了基础，如下文所述，供学术讨论和批判。

2.4. 量子力学中“能量存在”的相对性论

相对论，从宇宙本原哲学的角度分析，是关于“存在”在空间中存在、运动和变化过程的相对性理论。它应被理解为宇宙在空间中的“绝对存在”现象—以及这一现象的起源—表明宇宙是一个有生命的实体。

当狭义相对论通过光速的平方与质量关系（公式略去，众所周知）展现物质与能量的等价性时，量子力学则从反面科学证明：在信息因果条件作用下，能量能够产生物质。这正是能量与物质相互转化的相对性。同理，强相互作用与弱相互作用作为物质宇宙创生理论中的“能量存在”相对性—当费米子在玻色子的因果条件下形成时，便构成了物质。

这种相对性可以通过爱因斯坦的光速与亚光速理论来阐释：在此框架下，光速本身已达到无限值，没有任何速度能超越它。这种现象也可以通过运动、变化与平衡的热力学原理，或是电磁学中的阴阳结构模型来描述。其本质是对“能量存在”绝对变化的相对性描述—这正是阴阳能量生命存在的生动体现。

从宇宙本原哲学的视角来看， 强相互作用将能量凝聚为物质的理论 本质上是狭义相对论的逆向相对性，在本原层面具有等效性。同理推断， 若光速是物质存在中“质量”运动与变化的极限，那么普朗克定律（描述黑体辐射能量分布与频率或波长的关系）、普朗克常数（6.6260693（11）×10^-34 J·s）、普朗克长度（1.6×10^-35 m）、普朗克温度（1.4×10^32 K）以及普朗克密度（5.2×10^96 kg/m³），这些参数共同构成了能量与质量变化的极限。在形式上，我们可以借鉴M理论中的点弦、 膜等非物质哲学概念，来探寻“物质质量”节点的形成机制—这种机制未必被称为“上帝粒子”，而应理解为通过强相互作用与弱相互作用实现的粒子间相互感知与作用。

弱作用力和强作用力一样，也应该被理解为凝聚成“物质质量”的粒子之间的相互感知和相互作用。它的衰变特性带来了物质存在与变化相对性的概念。弱作用力的玻色子不应该具有质量；否则，它们就会失去作为作用力的信息特征。

如果经典力学和狭义相对论将“物质”的相对性描述为在时空中的活生生的存在，那么量子力学则是描述“能量”在时空中的活生生且不断变化的存在。我提出这一解释供学术讨论。

2.5. 开尔文勋爵的绝对零度“运动与变化”相对论

在物理学中，开尔文温标（K）被定义为以绝对零度为零点的热力学标度。这个温度代表一种理想化状态—物质中的分子和原子动能已降至最低，但粒子的量子零点能依然存在。因此，分子永远不会完全静止。绝对零度对应摄氏温标下的−273.15°C。

这是源于物质哲学的物理描述，科学界已确认能量可以具有零点能。量子或能量粒子处于持续变化和运动之中，因此应当建立以零为原点的坐标系和过程基准。在我的已发表著作中，我运用宇宙本原的逻辑构建了以绝对零度为零基准的能量坐标系，提出能量是基于宇宙本原的阴阳生命热力学存在，作为承载力学信息的阴阳载体（Samo Liu，2025c）。

常有学者指出，在接近绝对零度时，热德布罗意波长会变得极其漫长，此时粒子的物质波会产生显著重叠。从宇宙本原的逻辑推演来看，这种能量可能以光或电磁波的形式存在—这种非物质的存在或许对应着零维空间与绝对零度。在力学作用下，它可能呈现为非物质的点、弦或膜。学术界或许可以借鉴M理论中关于点、弦和膜的非物质哲学概念，来深化对能量如何催生物质的认知。光在什么条件下会转化为光

子？光子在什么条件下能转化为电子与正电子的阴阳态？它们又在什么条件下会以点、弦和膜的形式存在？在什么条件下能形成三维“质量”？我诚邀各位学者通过物质哲学与宇宙本原哲学的融合，共同探讨这些引人入胜的问题。

人们常将绝对零度描述为通过理想气体定律的外推得出：当温度降至绝对零度时，气体的体积或压力会归零。然而现实中，所有气体在接近绝对零度时都会表现出显著的量子特性—此时气体分子的运动不再遵循经典热力学的统计规律。随着温度趋近绝对零度，分子动能会趋向一个固定值，即所谓的零点能。在此状态下，所有粒子都处于最低能量状态，也就是我们常说的基态。

学术界应该反思极值、零点能和基态概念的本原。

从宇宙本原的角度来看，这些概念描述了一个零基态—本质上是无限的—它没有结构形式，不能用运动的状态来描述，也不能用时间的过程来描述。

开尔文勋爵的绝对零度理论本质上是宇宙本原的“运动和变化”相对论。

2.6.普朗克参数与“运动和变化”相对论

如果绝对零度代表了“物质和存在”运动与变化的最低限度—即物质和存在的本原，那么量子力学则描述了“能量存在”的运动与变化的形式和过程。

经典力学和爱因斯坦的相对论描述了物质运动和速度变化所表达的相对过程，以及三维“质量”形式的运动和速度变化的极限。

运用宇宙本原的同一逻辑，量子力学中的所有普朗克参数— 包括描述黑体辐射能量分布与频率或波长关系的普朗克定律、普朗克常数(6.6260693(11)×10^−34 J·s)、普朗克长度(1.6×10^−35米)、普朗克温度(1.4×10^32开尔文)、普朗克密度(5.2×10^96千克/m³)等—都可以视为“物质与能量存在”运动和变化的极限状态。普朗克的理论因此使他成为宇宙本原热力学“运动与变化相对论”的奠基人。

普朗克的相对论和开尔文的绝对零度相对论在物理上是等价的。他们发现了“物质”“存在”的极限，从科学上解决了人类对“无限”知识的“无知”。

2.7.麦克斯韦的电磁“结构变化”相对论

电磁力学虽然是在物质哲学的指导下产生的，是经典力学的一个分支，但它反映了宇宙中“物质和存在的结构”的阴阳、正负极和基于电荷的相互感知。

电磁力的产生完全取决于电荷与磁极的存在位置及其强度。没有阴阳的位置结构和电荷的大小，它们之间就没有相互感知。(公式略去，众所周知)。虽然物质质量可以转化为电能、热能和动能，但电磁力本身并不依赖于物质质量。

当伟大的物理学家麦克斯韦将电磁学与电磁场、 电磁波和光波联系起来时，一个宇宙本原的物理系统—类似于热力学系统—诞生了。

如果说牛顿是研究“物质运动”的物理学家，那么麦克斯韦便是探索“物质与存在”运动变化的杰出物理学家。电磁力学同样适用于物质与非物质能量。普朗克提出的“不连续”能量可能对应“物质”能量，而连续能量则可能对应宇宙本原的能量—这种能量受宇宙本原信息的支配。“自然”本身正是阴阳相生的鲜活结构形态。

在量子力学研究领域，物理学家狄拉克后来发现了光子与电子/正电子之间的关联，进一步证实了光是宇宙阴阳结构的本原。据说狄拉克对太极图有着浓厚兴趣，通过科学手段，他揭示了光子、光和光速之间的正负阴阳关系，证明了宇宙“阴阳无极”(无限)的无限形态。反之，他也证实了光、光速和光子之间“阴阳太极”的转化关系。

按照这个逻辑，光和光速是光子、电子和正电子的本原；光子是粒子的本原；而粒子又是物质质量的本原。目前，我们仍然不知道暗物质、暗能量、光和光子之间的逻辑关系—这很可能成为量子力学的下一个突破（Samo Liu，2025b）。

电磁力学已发展成为研究宇宙阴阳结构及其宇宙本原的学科。它本身是关于宇宙中“物质与存在”结构形式相互感知的相对论，以光速作为变化的媒介。

III. 光速与速度—爱因斯坦的“物质－能量转换”相对论

通过以上讨论和分析，我们可以看出牛顿用万有引力的数学 公式来表达物质物体之间的相互质量感知，在宏观世界中，这些物体是按照热力学熵原理运动和变化的。

爱因斯坦通过提出光速和光本身的概念，揭示了物质质量和能量的等价性，并清楚地表明了物质运动的终极状态以及“物质－能量转换”的存在。在他看来，物质运动和变化的过程及其终极极限都是能量。

爱因斯坦通过物质哲学与描述物质时空变化的相对论，勾勒出一个充满生机、不断演化的宇宙图景。这一伟大理论不仅阐明了物质与能量之间的相互转化，更在物理学巅峰时刻激励人类重新审视时空存在形式与过程的宇宙本原（Samo Liu，2025a）。

这是我在宇宙本原哲学视角下对爱因斯坦相对论的全面解读。同时，这也是我对开尔文勋爵绝对零度相对论的阐释，以及对前文所述所有力学理论—即空间中存在相对运动与变化的理论体系—的深入剖析。

人类通过物理学探索宇宙真理，但若单纯用物质哲学的逻辑来考量这些问题，矛盾便会显现。若能以宇宙本原为坐标系重新审视这些命题，或许就能开辟出新的认知路径。

上述观点提交给学术界进行讨论、批评和验证。

IV. 相对运动和相对变化，绝对运动和绝对变化

真理是宇宙存在与变迁的自然法则。它无需人类用语言描述，但为了生存发展，人类凭借思维逻辑能力创造了语言、文字和数字这些信息载体。通过科学、数学和坐标系探索宇宙存在的本质，我们最终构建了知识体系与信息网络。

人类利用知识和信息来研究和验证宇宙的存在、变化和本原。宇宙本原的原则告诉我们，宇宙的存在是一种客观的自然现实，独立于人类意志—它是有生命的，并随着时间的推移，在某些空间形式上发生变化。

在某一特定时刻，这种存在可以被看作是脱离时间而存在的，是一种以结构密度和排列为特征的结构形式。这就是经典物理学—一种静态物理学—的基础，但它却非常有用，有助于研究物理科学。

当爱因斯坦通过“四维时空”研究物理学时，他并不是在探索时空的更高维度，而是在将物理学应用于将宇宙的存在视为一个鲜活的研究对象—一个充满活力的存在—从而与道家和佛教思想中的宇宙本原哲学联系起来，并重新激活了古希腊的宇宙本原哲学。

从这个角度来看，暗能量和暗物质、粒子和夸克、分子和原子、细胞和人类细胞都可以被看作是宇宙中活生生的、不断变化的存在，每一个都可以被赋予自己的零基准坐标系，用于空间形态和时间过程，从而形成对宇宙本原的完整哲学探究。

因此，爱因斯坦的相对论发明使我们从逻辑上可以推断出热力学、电磁学和强弱核力也是相对论的一种，空间的自然本质及其存在就是绝对运动和绝对变化，以及相对运动和相对变化。

为了研究这种存在、运动和变化，人类必须使用语言、文字、数字、科学、数学和坐标系来理解存在的相对运动和相对变化反映了宇宙本原本身是绝对运动和绝对变化的事实。

前提是要理解空间和时间的本原，这是伟大的相对论给人类知识和信息带来的新灵感。

V. 结论

受现代科学知识和信息的启发，我写了几本关于宇宙本原哲学体系的书和文章，作为一种新的科学哲学思想，这一研究方向的逻辑越来越清楚。

这样的工作需要学术界的广泛参与，并通过科学哲学的态度进行验证和改进。

本文从物理学和热力学的框架出发，研究形式与变化，探讨运动、速度及光速等问题。它填补了亚里士多德《物理学》中因当时知识信息匮乏而产生的逻辑漏洞，并希望学术界能关注并讨论这些观点。

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Newton's Dynamic Laws

Dr. Esmat Bekir

ABSTRACT

Introduction: "Newton's Dynamic Laws" are concerned with the motion of bodies in orbits. Newton has published his Laws in 1684, [1], and expanded this work into later editions [2]. This work was written in Latin but it was translated in many versions in English, e.g. [3]. Because of his revolutionary ideas and his mastery of geometry, his work was not largely amenable to a great sector of scientists and physicists. Several attempts, e.g. [4]-[5] were made to simplify and clarify these laws. Modern derivations may be found in e.g. [6].

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I. DYNAMIC LAWS DERIVATION

This note summarizes Newton's derivation for the planetary dynamics. I have followed [5] very closely and stripped it of all historical notes for convenience. Newton's goal, in particular, was to find out the nature of the centripetal force that causes the planet to revolve around the Sun in an elliptical orbit. He argued that, without any external influence, the planet will move in straight line at constant velocity. It is this force that imparts acceleration to the body to make it adhere to orbit.

The following figure depicts the needed graphics for analysis. It looks very crowded but just in one figure it depicts all the essential parameters and the variables of our problem.

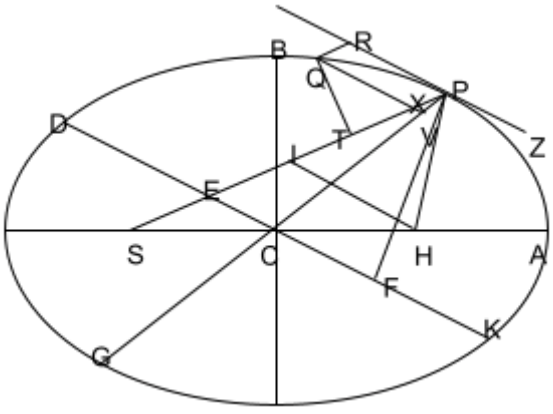

Figure 1: Based on Newton**'s** diagram for problem 3. A planet *P* moves in an elliptic orbit *APQB* about a center of force *S* located at a focus of the ellipse.

It shows the Sun, *S*, resides at one focus of the ellipse. The planet *P* moves along the elliptical curve *APQ*, the tangent at *P* is *ZPR*, and the centripetal force is along *PS*. Newton explains that at point *P*, if the force vanishes, the planet will move along the tangent to *R*. It is the centripetal force that will move *R* back to *Q* on the ellipse.

From Galileo's experiments, a body under the influence of central force will travel a distance proportional to the acceleration times the square of the traveled time. Conversely in time, δt, this acceleration, is proportional to QR, divided by $(\delta t)^2$.

Meanwhile, for any centripetal force, Newton proved that the line of force sweeps equal areas in equal times. This allowed him to describe the time geometrically by an area proportional to the time. That is $\delta t \propto SP \cdot QT$. Therefore, the acceleration is given by

$$A = \frac{QR}{(\delta t)^2} \propto \frac{QR}{(SP \cdot QT)^2} = \frac{QR}{SP^2 \cdot QT^2} \tag{1.1}$$

We shall analyze each term, but first introduce some preliminaries:

1. Newton's lemma:

$$PE = AC \tag{1.2}$$

Proof is given in Appendix A.

2. ΔPXV and ΔPEC are similar, hence $PX / PE = PV / PC$

$$PX = (PE \cdot PV) / PC \tag{1.3}$$

3. Apollonius: Prop 15, Book1 $PV \cdot GV / QV^2 = PC^2 / CD^2$

$$PV = (QV^2 \cdot PC^2) / (CD^2 \cdot GV) \tag{1.4}$$

Aside from the proofs given in [7], Appendix B provides a little simple proof.

4. The shape QRPX is quadrilateral,

$$\square QRPX \Rightarrow QR = PX \tag{1.5}$$

Thus, the last four equations yield,

$$QR = PX = (PE \cdot PV) / PC = (AC \cdot QV^2 \cdot PC) / (CD^2 \cdot GV) \tag{1.6}$$

5. Apollonius: Prop 31, Book7

$$CA \cdot CB = CD \cdot PF \tag{1.7}$$

Proof is given in Appendix C.

6. ΔQTX and ΔPFE are similar, hence

$$QT / QX = PF / PE \tag{1.8}$$

Substituting from Eqs. (1.2) and (1.7) into (1.8) gives

$$\begin{aligned} &QT / QX = (CA \cdot CB) / (CA \cdot CD) \Rightarrow \\ &QT = (QX \cdot CB) / CD \end{aligned} \tag{1.9}$$

Now, Eqs. (1.6) and (1.9) yield

$$\begin{aligned} \frac{QR}{QT^2} &= (AC \cdot QV^2 \cdot PC \cdot CD^2) / (CD^2 \cdot GV \cdot CB^2 \cdot QX^2) \\ &= (AC / CB^2) \cdot (PC / GV) \cdot (QV^2 / QX^2) \end{aligned} \tag{1.10}$$

In the limit Q approaches P. Consequently V and X will approach P. That is

$$GV = 2PC$$
$$QX = QV \tag{1.11}$$

Using the above equation in Eq. (1.10) gives

$$\frac{QR}{QT^2} = (2/L)\cdot(1/2) = 1/L \tag{1.12}$$

Here, $L = CB^2/(2AC)$ is the latus rectum of the ellipse. Finally, Eq. (1.1) results in,

$$A = \frac{QR}{(\delta t)^2} \propto \frac{QR}{(SP\cdot QT)^2} = \frac{(1/L)}{SP^2} \propto \frac{1}{SP^2} \tag{1.13}$$

In words, the centripetal force is inversely proportional to the Sun/Planet radius squared.

Kepler's Third Law

Newton then gave a proof to Kepler's third law – the orbit's period is proportional to one and half the power of the ellipse major axis diameter. Herein, we provide a proof that is a little variant from Newton's.

Newton has shown that for any centripetal force, a planet will sweep an area proportional to time. Thus from the diagram, the area swept for the infinitesimal time, δt, is

$$Swept\ area\ in\ \delta t = SP\cdot QT \Rightarrow$$
$$rate\ of\ Swept\ area = SP\cdot QT/\delta t \tag{1.14}$$

Since ellipse area $= \pi\cdot CB\cdot AC$, then the time period T is

$$T = \pi\cdot CB\cdot AC/(SP\cdot QT/\delta t) = \pi\cdot CB\cdot AC\cdot\delta t/(SP\cdot QT) \tag{1.15}$$

Squaring each side of Eq. (1.15) yields,

$$T^2 = \pi^2\cdot CB^2\cdot AC^2\cdot\delta t^2/(SP^2\cdot QT^2) \tag{1.16}$$

Substituting for QT from Eq.(1.12) into the above gives

$$T^2 = \pi^2\cdot CB^2\cdot AC^2\cdot\delta t^2/(SP^2\cdot L\cdot QR) \tag{1.17}$$

Since $L = CB^2/(2AC)$, the above can be simplified to

$$T^2 = AC^3\cdot\left[2\pi^2\cdot\delta t^2/(SP^2\cdot QR)\right] \tag{1.18}$$

Equation (1.13) implies $QR\cdot SP^2 \propto (\delta t)^2$ and therefore, makes (1.18)

$$T^2 \propto AC^3 \tag{1.19}$$

That is the orbit's period squared is proportional to the cube of the ellipse semi axis diameter.

Appendix A

Newton's Lemma
PE=AC

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Proof: H is the 2nd foci of the ellipse from which we draw HI parallel to RPZ. Ellipse reflection property, [8], states $\angle HZP = \angle SPR$. Therefore, $\angle PHI = \angle HZP = \angle SPR = \angle HIP$. Hence ΔHIP is equal sided triangle and $PH=PI$.
Moreover:

$$PH + PS = 2AC \Rightarrow$$
$$PI + (PI + EI + SE) = 2PI + (EI + SE) = 2AC \quad \text{(A.1)}$$

Since HI parallel to RPZ and thus to DK and since $SC=CH$, then $SE=EI$. Therefore

$$2PI + 2EI = 2PE = 2AC \quad \text{(A.2)}$$

or,

$$PE = AC \quad \text{(A.3)}$$

Appendix B

Chord Bisector
Apollonius Proposition 15

The eccentric circle is that one that shares the ellipse's major axis. Herein, we project the ellipse points P, Q, D, G and K onto P', Q', D', G' and K' on the eccentric circle. Consequently, the lines $P'CG'$ and $D'CK'$ become two perpendicular diameters in the eccentric circle. The point V on the CP is mapped onto V' on the line $P'Q'$ so that $Q'V'$ is perpendicular to the diameter $P'CG'$, hence

$$V'P' \cdot G'V' = Q'V'^2 \quad \text{(B.1)}$$

Notice that $\Delta CVV'$ is similar to $\Delta CPP'$, thus

$$\frac{VP}{V'P'} = \frac{CP}{CP'} \quad \text{(B.2)}$$

Likewise $\Delta CGG'$ is similar to $\Delta CPP'$, thus

$$\frac{VG}{V'G'} = \frac{CP}{CP'} \quad \text{(B.3)}$$

The above two equations give

$$\frac{VP \cdot VG}{V'P' \cdot V'G'} = \frac{CP^2}{CP'^2} \quad \text{(B.4)}$$

Substituting from (B.1) yields

$$VP \cdot VG = Q'V'^2 \frac{CP^2}{CP'^2} \quad \text{(B.5)}$$

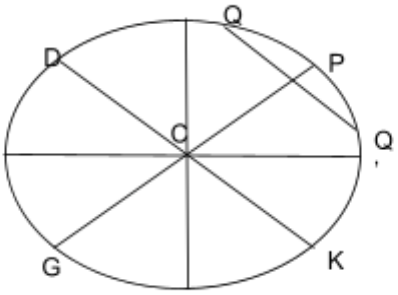

Figure 2a: The diameter *PG* bisects the chord *QQ'* and *DK*. From Proposition 15 of Book 1 of *Apollonius's Conics*, the ratio of $PV \times VG/QV^2$ equals the ratio PC^2/DC^2.

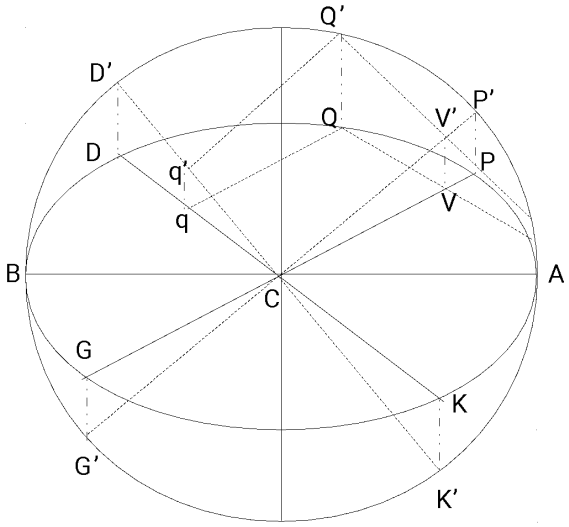

Figure 2b: projecting the ellipse points *P, Q, D, G* and *K* onto *P', Q', D', G'* and *K'* on the eccentric circle.

What remains is to relate *QV* to *Q'V'*. We know that *QV* is parallel to *DC*, so from *Q* we draw a parallel to *PC* until it meets *DC* in *q*, therefore *Cq=QV*. Project *q* onto point *q'* on *D'C*, and it is straight forward to prove that *C q'=Q'V'*. Now *ΔCDD'* is similar to *ΔCqq'*, Thus

$$\frac{V'Q'}{VQ} = \frac{Cq'}{Cq} = \frac{CD'}{CD} \tag{B.6}$$

Substituting in (B.5) results in

$$VP \cdot VG = QV^2 \frac{CD'^2}{CD^2} \frac{CP^2}{CP'^2} \tag{B.7}$$

But *CP'=CD'=a* implies that

$$VP \cdot VG = QV^2 \frac{CP^2}{CD^2} \tag{B.8}$$

Appendix C

Parallelogram area Equivalence
Apollonius Proposition 31 Book 7

With reference to Fig. 3 below, we introduce two proofs.

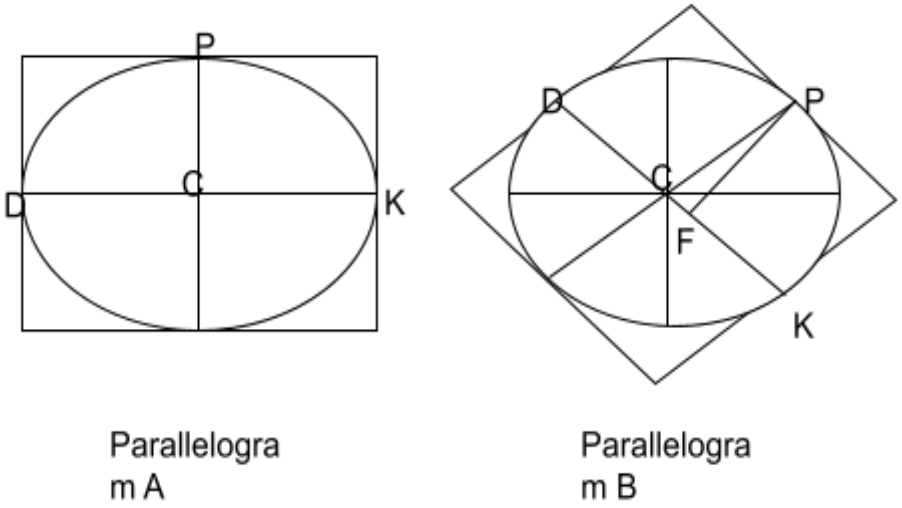

Figure 3a: Area of parallelogram A is equal to area of parallelogram B (Proposition 31, Book 7, of the Conics of Apollonius of Perga).

Method 1: geometric algebra

Let *P'* and *D'* be the points on the eccentric circle from which their projection *P* and *D* on the ellipse are obtained. The coordinates of $\overline{P}$ and $\overline{D}$ are then given by

$$x_p = x_1 \quad y_p = \frac{a}{b} y_1 = \frac{am_1}{b} x_1 \tag{C.1}$$

and,

$$x_d = x_2 = \frac{a}{b} y_1 == \frac{am_1}{b} x_1 = y_p \qquad y_d = \frac{a}{b} y_2 = x_1 \tag{C.2}$$

Since $x_d = y_p$ and $y_d = x_p$ then *CP'* and *CD'* are perpendicular and thus the area enclosed by *CP'* and *CD'*

$=CK^2 = a^2$. Therefore the area enclosed by CP and $CD = \frac{b}{a} CK^2 = ab$ as desired.

Method 2: vector analysis: In Fig. 3b, let *P* and *D* denote the points $P_1(x_1, y_1)$ and $P_2(x_2, y_2)$ respectively. The area *PCD* is then given by the cross product of vectors *CP* and *CD*. Thus

$$\begin{Vmatrix} x_1 & x_2 \\ y_1 & y_2 \end{Vmatrix} = x_1 y_2 - x_2 y_1 = x_1 \frac{b}{a} x_1 + \frac{a}{b} m_1 x_1 m_1 x_1 = \frac{1}{ab} x_1^2 (b^2 + a^2 m_1^2)$$

$$= \frac{a^2 b^2}{ab} = ab \qquad Q.E.D$$

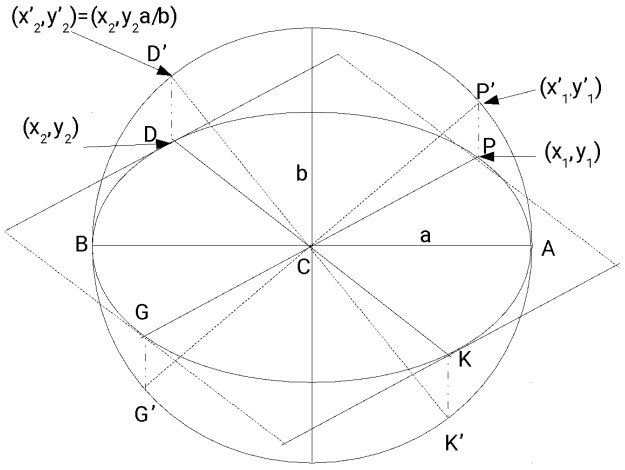

Figure 3b: Projecting the ellipse points *P, D, G* and *K* onto *P'D', G'* and *K'* on the eccentric circle.

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Material and Non-Material Substance- A Study on the Cosmic Origin in *Metaphysics*

Samo Liu

ABSTRACT

Metaphysics is a monumental work in the history of world philosophy. It provides unprecedented inspiration for the contemplation of the "unknown," serving as a cornerstone for both Eastern and Western philosophical reflections on the material world.

The ancient Greek philosophers proposed many unsystematic, contradictory, and fragmented notions of cosmic origin and ontology. In Metaphysics, these concepts were collected and synthesised; Aristotle analysed and critiqued them through the logical framework of the "known" material philosophy.

Eastern philosophy also possesses systematic metaphysical concepts and grapples with the paradox of "being" and "non-being" in its contemplation of the cosmic origin. The Taoist philosophy, centred on the I Ching, emphasises the dialectical unity of "being" and "non-being," with the central theme being the Tao—change and balance. When Buddhist philosophy entered China, its ideas of cosmic origin fused with those of Taoism. Confucian scholars then developed the unified Confucian-Buddhist-Taoist cosmological doctrine, which reached its zenith during the Song Dynasty (Feng Youlan, 2013).

Keywords: material existence; non-material existence; motion and change; cosmic origin; material origin, Substance.

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However, the languages, text, and numbers developed from the "known" material philosophy continue to dominate human intellectual expression, and the debates persist. Relativity theory, quantum mechanics, and the three industrial revolutions have transformed human understanding from material science to energy science and information science, proving that matter is the mutual transformation between energy (non-material) and matter under the control of mechanical information.

Thus, the cosmic and material origin lies in the dynamic interplay of information (non-material) and energy (non-material)—the yin-yang essence of existence—seeking and attaining balance through perpetual motion and transformation. At its root, the universe itself is the coexistence and evolution of material and non-material existence under the participation of information.

This paper studies and interprets the cosmic origin thought of Metaphysics with the knowledge of "known".“Matter” is the “yin-yang Substance（benti本体）” of "energy", “Energy (immaterial)” and "information" constitute the “origin（benyuan本原）”“Substance（benti本体）” of "matter"。

Keywords: material existence; non-material existence; motion and change; cosmic origin; material origin, Substance.

Author: China Occupational Safety and Health Association, Beijing, China.

I. LITERATURE REVIEW

1.1 On Mind and Soul

Human beings are composed of matter—what we call the body or cellular structure. Yet the movements and actions of a living human body are directed by the brain, and the living brain itself is governed by

the mind, soul, thought, and consciousness. What, then, is the origin of these terms—mind, soul, and thought?

This question pertains to the primordial existence of humanity and touches upon life and death, (Samo Liu, 2025d)This is a special kind of intelligence and wisdom that the universe has bestowed upon humanity, enabling us to think in a dialectical manner.These thoughts involve human 'metaphysical knowledge' and existence.

Humans, as intelligent matter, have created languages, text, and numbers—tools for expressing information. This allows humanity to express its own existence, the existence of all things in the cosmos, and the relationships between itself and the universe, thus enabling the study of self, cosmos, and existence. (Samo Liu, 2025e)

Even without humankind, the universe and all beings would still exist. Without human language, text, or numbers, the universe would remain an objective existence, unaffected by human subjective will. Yet by creating linguistic and mathematical systems—language, characters, numbers, mathematics, coordinate systems, and scientific models—humans opened a new era of cosmic self-understanding within the human realm.

Aristotle pioneered the logical method of using the known to investigate the unknown, establishing the analytical foundation of material philosophy and material science. Humanity thus entered a flourishing period of material science, reached the pinnacle of modern physics, and transitioned into the domains of energy and information science. Humans began to study the micro-composition of their own cellular structures, harnessed atomic energy, and invented computers and robots.

Humans have, in a sense, become gods—creating machines in their own likeness called robots. Although made of synthetic materials, robots operate through software created by humans. Humans endowed them with a form of "mind," "soul," and "thought."

From this we can reason: just as humans created robots and their "minds," so too did the universe create humans and the human mind. Yet, with current knowledge, humanity still cannot determine how the human body and its cells were created, nor what kind of existence the human mind truly is. Therefore, following Aristotle's method of using the known to explore the unknown, we may extend our understanding of the human mind and soul, and by analogy, the mind and soul of the universe itself.

1.2 Matter and Non-Matter

Following the above logic and earlier works (Samo Liu, 2025a; 2025b; 2025c): humans created robots and their minds; the universe created humans and the human mind. Applying Aristotle's logic of judging the unknown through the known, and now possessing the knowledge of energy science and information science, we can analyse the "mind" using today's understanding.

According to modern physics, information theory, and systems science, the mind and soul can be categorised as informational entities. Norbert Wiener, the founder of cybernetics, asserted that "information is neither matter nor energy." Thus, it belongs to the category of non-material existence. (Samo Liu, 2024b)

From an Aristotelian perspective, this type of existence can be regarded as the First Cause or Prime Mover—a divine or metaphysical existence that could not be explained by the knowledge available in Aristotle's time. (Samo Liu, 2025d)

In Taoist cosmology, such existence corresponds to the yin阴 aspect; in Buddhist cosmology, it represents the cause因 or seed of being. (Samo Liu, 2025f)

Integrating Taoist and Buddhist cosmological thought, there also exists a complementary category of yang阳 existence and factor因素。The relationship between yin and yang, cause and effect, follows the natural principle of interdependence and the dynamic generation and restriction of the Five Elements. Its ultimate aim is balance and the Middle Way—"action through non-action无为而为" and "emptiness of the five aggregates五蕴皆空"—which constitute the natural equilibrium of the cosmic origin.

Modern physics reveals that yang existence and causal elements manifest as material existence, whose origin lies in a form of non-material energy: particles and quarks, dark matter and dark energy. The ultimate sources of these yang entities are absolute zero, light, and absolute space. (Samo Liu, 2025i)

From this reasoning, we may classify universal existence into three tiers:

Material existence - molecules, atoms, and cells, including human, animal, and plant cells, as well as galaxies and celestial bodies. (Samo Liu, 2025d)

The origin of matter: non-material energy — particles, quarks, and possibly dark matter and dark energy.

The origin of energy - existence within absolute zero, light, and absolute space; Physics also tells us that "energy" arises from the motion and changes of "matter".

All these yang existences exist in states of absolute motion and transformation. Physics studies their relative motion and change.（Samo Liu, 2025i)

All physical forces discovered by science are, in essence, theories describing the relative motion and transformation of material existence. (Samo Liu, 2025d)

All yang existences operate within the cyclical yin-yang transformations of the Five Elements, under the influence of informational existence—what we call mind and soul. Everything beyond matter is termed non-material existence. These non-material existences constitute both the origin and the destination of material existence. (Samo Liu, 2024i)

Analytical Foundations

Philosophical foundations: Buddhist cosmological thought "The Diamond Sutra and the Heart Sutra"; Taoist cosmological classics including Tao Te Ching, Wenzi, Zhuangzi, Liezi; Wang Yangming's Philosophy of Mind; Leibniz's Monadology; Newton's theory of material motion.

Scientific foundations: Modern physics, contemporary science, systems science, and mineral processing science.

Philosophical methodology: Dialectical materialism and Aristotle's Metaphysics.

II. RESEARCH AND DISCUSSION

2.1 Aristotle's Metaphysics

Aristotle's Metaphysics, like his Physics, is a work dedicated to exploring the origins of the universe. While Physics studies the changes within "being" itself and the relationships of motion between existences, Metaphysics focuses on the "first cause" and "first principle" behind motion and change — the fundamental reason why existence moves and transforms.

The main questions addressed in this work include:

What is the origin of the universe?
What is the origin of matter?
What is the origin of humanity?
Does the soul exist?
What are free will and causality?

This monumental treatise was compiled more than 200 years after Aristotle's death by his intellectual successor, Andronicus of Rhodes, who arranged his writings on essence, soul, will, and freedom into a collection placed after Physics — hence the title Metaphysics ("after physics"), implying both sequence and transcendence beyond the physical.

Metaphysics applies material-philosophical reasoning to study non-material issues, though in Aristotle's time, the available knowledge and information were insufficient to define or verify the concept and nature of "non-material" existence.

Traditionally, metaphysics is considered an early branch of philosophy concerned with speculative and rational reflection on the essence of the world and the cosmos in the absence of empirical or scientific verification. In other words, it represents humanity's philosophical exploration of the unknown — a cosmic-origin philosophy rooted in ontology.

Philosophers generally regard metaphysics as Aristotle's "first philosophy." No, Metaphysics, or cosmic-origin philosophy, uses material philosophy — the First Philosophy — as a method: to use the known to explore the unknown.

The Second Philosophy is material science, which studies epistemology and methodology through scientific logic, And put it into practical engineering applications.

Aristotle used material philosophy to study nature, the cosmos, and human society, establishing the foundations for the classification of natural and social sciences. Experimental and logical methods of scientific philosophy are deeply embedded in his works.

Throughout history, whether Kant questioned how metaphysics is possible, Nietzsche claimed it impossible, Hegel reconstructed it dialectically to create dialectics, Heidegger transformed it from static to dynamic existence, or Wittgenstein and the Vienna Circle rejected it as meaningless due to lack of empirical verification — none could overshadow the intellectual brilliance of Aristotle's metaphysical philosophy.

The history of human thought unfolds through time, Every critique of metaphysics is but a premature judgment made when scientific knowledge and information are still insufficient. Some even accuse Aristotle of being an irrational idealist, yet his works show no such evidence. He was not a mystic but a rigorously logical thinker.

Due to the limited knowledge of his era, Aristotle employed material philosophy to advance human thought, setting aside systematic inquiry into the origins of space and time. The lack of a structured theory of space and time in ancient Greek philosophy led him to hand these unknowns to theology and mysticism, but his use of material philosophy and material science nonetheless opened a new chapter in human intellectual and scientific progress.

The Chinese title "形而上学" (Xíng ér shàng xué) for Metaphysics was first translated by Japanese scholar Tetsujirō Inoue, derived from the I Ching: "That which is beyond form is called the Dao; that which is within form is called the instrument." (《易经》:"形而上者谓之道, 形而下者谓之器")

Chinese scholar Yan Fu preferred the term “玄学” (Xuanxue), originating from Tao Te Ching: “Profound upon profound, the gateway to all mysteries.”（《道德经》:“玄之又玄，众妙之门”）

Today, “形而上学” is the more commonly used term.

Modern physics and successive industrial revolutions have shifted human knowledge from material science to energy science and information science, verifying the ancient cosmological insight that the "void" and "nothingness" represent the non-material variability and dualistic essence of existence. Hence, it is time to revisit and reinterpret Aristotle's Metaphysics in light of this new understanding.

The Structure of the Chinese Edition of Metaphysics

The Chinese translation of Metaphysics contains fourteen books.Many versions, Here is one of them. (Aristotle, 2016)

Book I overview of Ancient Greek Philosophy (10 chapters, pp. 1-33)

Chapter 1 discusses the human instinct for knowledge, the evolution of techne (craft/skill), and concludes that technology surpasses experience. It also asserts that the growth of knowledge and information must be guided by philosophical wisdom (pp. 1–4).

Chapter 2 distinguishes philosophers from ordinary people by their superior wisdom and knowledge, claiming that intellectual wisdom surpasses practical knowledge and that philosophy — though seemingly useless — is the most noble form of knowledge (pp. 4–6). Aristotle extols philosophy to the highest degree, quoting Simonides: "Only the gods have the privilege of explaining nature." Ancient Greek philosophy encompassed science, philosophy, and religion; Aristotle was the first to separate them. He also noted that the gods were regarded as the cause and origin of all things. Today, the mysteries of nature's divinity have been revealed by physicists, thus inheriting that divine privilege. (Samo Liu, 2024g; 2024h; 2024i)

Chapter 3 analyses the Four Causes — material, formal, efficient, and final — and critiques earlier Greek philosophers’ explanations. Examples include Thales’s water-origin theory, Anaximenes’s air-origin theory, Heraclitus’s fire-origin theory, Empedocles’s four-element theory (water, air, fire, earth), Parmenides’s ontology of being, and Anaxagoras’s Nous (Mind) theory (pp. 7–10).

Chapter 4 reviews the cosmological theories of Hesiod, Parmenides, Empedocles, Leucippus, and Democritus’s atomism. Aristotle applied material philosophy and moral reasoning to evaluate them, unlike Taoism’s "acting through non-action"（无为而为） or Buddhism’s "emptiness of the five aggregates"（五蕴皆空）. He also introduced the notions of no-contradiction（law of non-contradiction）, being and non-being, and affirmation and negation — concepts resembling the yin–yang duality of Eastern cosmology (pp. 11–13).

Since the first cause is a non-material attribute, material philosophy alone cannot adequately address it — just as Newton could not explain absolute space through material philosophy. This is not a flaw of Aristotle or Newton; without relativity and quantum theory, even today we could not meaningfully discuss energy and information as non-material existences.

Chapter 5 studies the Pythagorean doctrine of “all things are numbers,” treating number as both form cause and material cause. It examines Parmenides’s ideas of the “One” and “the many,” who held that the “One” is infinite and divine. At that time, the concept of zero had not yet emerged. Parmenides argued that beyond being there is no non-being, and that what exists must be one; non-being cannot exist (pp. 13–17).Information theory today can be interpreted as the existence of 0 and 1.

Interpreted through cosmic-origin philosophy, being as a noun expresses existence; being as a verb or adjective implies spatial form and temporal process — thus, to exist is to be alive, The universe is life itself.(Samo Liu, 2024a)

Chapter 6 examines the integrated philosophies of Plato, Heraclitus, and Pythagoras (pp. 17–20). Several of its ideas align with Eastern cosmological thought:

It asserts that all perceptible things are in constant flux, and for that reason, no universal definition can hold for them, since they are ever-changing.

It also proposes that number, in relation to matter, arises from the comparison of large and small; in relation to cause, it corresponds to unity — "the participation of the large and the small in the One" yields number.

As the concept of zero was unknown then, I suggest that the relationship of large and small should be understood as participation in zero, not in one; all understanding of existence must be based on a coordinate system with zero as the origin. (Samo Liu, 2024h)

Aristotle also regarded the Pythagorean concept of "the One（yuanyi元一） as substance" as analogous to the Eastern notion of Wuji (the Infinite无极). He further proposed a binary origin of the universe, akin to the Eastern idea of Taiji (the Great Ultimate太极). Yet, he did not combine Wuji and Taiji — in truth, Taiji is the living foundation of Wuji.

Finally, he criticised the analysis of the cosmic origin through morality categories such as good and evil, since these are subjective constructs of human consciousness. The universe itself has no moral consciousness — only the natural principles of "acting through non-action无为而为" and "emptiness of all aggregates一切法空。" (Samo Liu, 2024i)

Chapter 7 summarises and evaluates the cosmological theories of ancient Greek philosophers, concluding that none sufficiently explained the problem of the Four Causes (pp. 20–21). In contrast, Taoist and Buddhist cosmologies systematically integrated these principles. (Samo Liu, 2025c)

Chapter 8 critiques each philosopher individually, noting that they discussed only substantial entities while ignoring non-substantial ones, even though such entities exist. What Aristotle called non-substantial beings are what I define as non-material existences. Although he lacked this terminology, he logically inferred and affirmed their existence as efficient causes and ontological foundations.

Chapter 9 continues the discussion of cosmological thought (pp. 25–33), introducing terms such as idea理型, form通型, the third man, binary body, and participation, and examining their relationships and contradictions with number.

These correspond closely to Eastern concepts such as Wuji 无极(the Infinite), Taiji 太极(the Great Ultimate), causal conditions, and yin–yang阴阳。 However, ancient Greek philosophy lacked systematic coherence, expressing these ideas in scattered and often contradictory ways. Aristotle used material logic to critique these inconsistencies.

This chapter also addresses the relationship between elements and numbers — especially between 1 and 2 — exploring issues of greater and lesser, long and short, many and few. His analysis, however, was less comprehensive than that of Taoist or Buddhist cosmology. (Samo Liu, 2024i; 2025c)

In my logical framework, I employ a zero-based coordinate system to analyse the existence and transformation of "factors." (Samo Liu, 2024g; 2024h; 2025h)

Chapter 10 concludes that the ultimate aim of philosophy is to investigate the Four Causes; all Greek explanations of the universe's origin and the principles governing existence and transformation remain bound within this framework.

Book II: An Outline of Philosophical and Scholarly Inquiry (three chapters in total, pp. 34–39)

Chapter 1 (pp. 34–36) argues that, because human wisdom is limited, truth is not easily grasped; however, as knowledge accumulates, each person contributes something to our understanding of truth. Chapter 2 (pp. 36–38) maintains that the Four Causes are foundational to philosophical analysis. Any analysis of the cosmos and of existence must posit a first principle; the chain and types of causes cannot be infinite; what has a beginning in form and in temporal process must also have an end, and there must be an efficient cause and a final cause.

Chapter 3 (pp. 38–39) discusses scholarly methods of research and the organisation of disciplines.

Book III: On the Themes of Philosophy (six chapters, pp. 40–61)

Chapter 1 holds that philosophical inquiry arises from doubt, and that aporia and dialectical testing resolve perplexities. Aristotle lists thirteen research themes: these are scientific-philosophical questions derived from material-philosophical reflection. The seventh theme proposes studying causal relations beyond matter—causality grounded in existence itself; the thirteenth asks whether "number" and "point, line, and plane" possess ontological status. If they do, are they mixed with sensible things or separate from them? (pp. 40–42) This problem has never been decisively settled, giving rise to notions such as "four-dimensional spacetime," "higher dimensions," and "time reversal," and to certain tensions in modern physics. (Samo Liu, 2025a; 2025b; 2025c)

Chapter 2 (1) (pp. 43–48) asks whether things either wholly possess the Four Causes or only partially, and whether there might be one discipline that integrates the study of all four. Only philosophy can do this, he argues. Aristotle's material philosophy coordinated research in material science and in the cosmology of first principles, laying the groundwork for over two millennia of vigorous development in physics as well as in philosophy and theology. Yet, given the incompleteness of knowledge in his time, a comprehensive study of the cosmic origin was not possible. Today, with relativity and quantum mechanics, we possess knowledge adequate for holistic inquiry into cosmic origin and ontology; Taoist and Buddhist cosmologies and dialectical materialism may be consulted for such research. (Samo Liu, 2024g; 2024h; 2024i)

As a discipline concerned with the ontology of the cosmos, how does philosophy cognise first principles? (p. 43) Aristotle holds that in each thing the final cause is inherent, impelling its generation, existence, and change. For an unchanging origin or ousia, change is inapplicable—clearly, ancient Greek philosophy did not recognise the non-material, Wuji (the Unlimited), or yin–yang transformation, and therefore regarded the cosmic origin or ontology as "unchanging." This may be why some later deemed "metaphysics" and dialectics to be opposed.

If the cosmic origin is "unchanging," whence the material universe? From Aristotle's text, his intent appears otherwise, and later readers have misunderstood him. In Book IV, Chapter 8 (pp. 88–90), he explicitly criticises such one-sided, humanly constructed judgments that "all is at rest" or "all is in flux." He posits that the cosmic origin is a non-changing existence that, while itself unmoved, is the cause of all motion and change—a remarkably advanced view. However, he does not explain that the "unchanging" Wuji is itself a living yin–yang dynamism involving cosmic balance—an area where ancient Greek philosophy lacked resources.

Over two millennia of scientific-philosophical development have yielded: physics addressing the motivation of the cosmic origin; quantum mechanics and relativity addressing the material cause;

thermodynamics addressing the final cause; and electromagnetism addressing the yin–yang structural cause. (Samo Liu, 2024i)

What remains unresolved is the formal cause of existence, closely tied to space. Why does a human have a human form? Why do animals have animal forms? Why do stones have their structures and shapes? What forms do particles and dark matter take? Since forms of existence differ, a dedicated discipline is needed for the study of formal cause. Yet no discipline can dispense with philosophical guidance. For example, to study the cosmic origin with material philosophy—rather than with a cosmic-origin philosophy—is to invite contradiction. The philosophy of cosmic origin should adopt energy and information perspectives—non-material modes of thought—drawing on Eastern cosmologies and dialectical materialism.

Chapter 2 (2) (3) (4) examines whether the discipline that studies cosmic ontology should also research the general rules common to all disciplines; whether philosophy may study every cosmic ontology and origin; whether there is another discipline for the properties of things; and, if philosophy is not limited to ontology, whether it should integrate the chief properties of things. Such reflections enabled Aristotle to pioneer the classification of natural and social sciences and to establish philosophy as the core and soul of scholarly inquiry.

Chapter 2 (5) asks whether there is an imperceptible cosmic ontology, and whether there are "intermediate entities" or a discipline for such intermediates. Modern physics and science have answered his question with the mechanics of relations and causal conditions between existences.

Chapter 3 (6) (7) asks: If first principles are an academic subject, should they be ranked the highest or the lowest? The answer: the highest. Aristotle's material-philosophical method opened the path to studying material science in the cosmos, leading to its flourishing. However, the period lacked the scientific basis for studying the cosmic origin in full; the fragmentary and unsystematic Greek doctrines of the cosmic origin could not satisfy his logical analysis. Modern physics now provides the knowledge and information to study the cosmic origin; the first principles for this inquiry are still the highest discipline. (Samo Liu, 2024i; 2025a)

Chapter 4 (8) (9) (10) (11) treats several issues with clear logic though inconclusive results. For example: cognition relies on things sharing common and universal properties and cannot dispense with particulars; yet should first principles belong to a kind or to the number 1? The text leaves this unclear.

They should belong to 0: the study of the cosmic origin ought to begin from zero.

Chapter 5 (12) discusses whether the "number", "point", "line", "plane", "cube" are "ontology"?Substance（benti本体）? If not, then what is it that causes us to be so confused about the "Substance" of things?Change, motion, relationship, tendency, and proportion cannot reveal the "Substance" of anything, Because none of them represent the essence of things themselves.The inference is that the attributes of an "Substance" should not be considered as actually existing.

Chapter 6 (13) Make a great inference:Elements (factors) may exist as 'potential' or 'a state of being' —unformed immaterial entities—before actual existence, Modern physics has proven the validity of this inference.

Chapter 6 (14) emphasizes the importance of studying the "Substance" of things, that is, examining what makes something "what it is" rather than merely focusing on it "exists".

Book IV: On the Scope of Philosophy (eight chapters)

Chapter 1 (p. 62) holds that to grasp being qua being, one must seek the first cause-being qua being or being as being.

Chapter 2 (pp. 63–68) asserts that the study of cosmic origin must begin with the principles and causes of matter. Aristotle, through material philosophy, opened research in material science and also advanced the study of cosmology and theology. He holds that material existence is intimately bound to the "primal One, " and, in examining the relations among opposites, the original One, and the many, concludes that all things arise from opposition, which can be reduced to "is and is-not, " "the original One, " and "the many." This may be understood as yin–yang, Wuji, and Taiji. Although Aristotle did not study Eastern cosmology, the line of thought in this chapter resonates with Zhou Dunyi's Explanation of the Taiji Diagram（太极图说）. (Samo Liu, 2025c)

Chapter 3 (pp. 68–70) maintains that philosophy investigates common rules and axioms applicable across disciplines. The most certain among first principles is the principle of contradiction/complementarity between yin and yang—the fundamental principle of cosmic activity.

Chapters 4 and 5 (pp. 70–84) examine the law of contradiction. Aristotle deems it unnecessary to prove; attempts at proof lead to paradox. Using the terms "is" and "is-not, " he formulates the proposition of yin–yang contradiction and offers multiple arguments for the undeniability of the law: to deny it is to erase all differences among things. This recalls Zhu Xi's Neo-Confucian Principle Learning（理学）.

In the field of philosophy, this concept is usually translated as "law of non-contradiction"; however, I believe it should be called "law of contradiction." Aristotle expressed this in plain language: "Contradiction" is a term created by humans. Humans exist within contradictions, and we use language, words, and numbers to describe them, identify them, and resolve them. Contradictions can lead to debates or even sophistry; yet being fixated on them or being unable to resolve them can cause depression or lead to confrontations.

The universe does not contain any "contradictions." "Being" is simply "Being, " and "no-being" is simply "no-Being"; "existence" means "existence, " and "non-existence" means "non-existence." These concepts are determined by the "Origin本原" and "Substence本体" of the universe. Humans can only study these principles; even if they are able to create new forms of "existence, " such creations must still conform to these fundamental laws.

Perhaps Aristotle never studied Eastern philosophy, but his thoughts always coincided with the Eastern concepts of the origin of the universe.

Chapter 5 further argues that denying or doubting the law of contradiction undermines confidence in the veracity of sense perception. He also criticises ancient Greek phenomenologists for generalising the total truth of the cosmos from partial phenomena. At the same time, he affirms that there truly is an "unchanging existence" in the universe. Interpreted through Eastern cosmology, this "unchanging existence" is non-material existence—a primordial non-material being: absolute zero, absolute space, and light. This is a balanced state of yin–yang, intelligible as "unchanging," yet it is the living Wuji of yin–yang. (Samo Liu, 2025c)

Chapter 6 (pp. 84–86) studies relations between things and argues that such relations are inexhaustible; therefore not everything can be proved. This resembles Taoist yin–yang and the Buddhist notion of dependent origination.

Chapter 7 discusses the law of excluded middle. Here it is akin to Taoist balance and the Buddhist Middle Way, yet material-philosophical reasoning alone cannot derive conclusions about the cosmic origin.

Chapter 8 argues that “everything moves” and “everything is at rest” constitute a philosophical antinomy. From this chapter’s analysis, the tendency in later philosophy to oppose “metaphysics” to dialectics appears to be a misjudgement.

In sum, Eastern philosophy interprets the cosmic origin through a systematic but hard-to-know logic of direct apprehension; without scientific achievements it is difficult to secure recognition. Aristotle, by contrast, used the known to infer the unknown, employing an easy-to-know logic to interpret the less systematic Greek cosmologies. He opened a road for material science through material philosophy and also applied material-philosophical reasoning to the cosmic origin. Although his era lacked the complete knowledge and information necessary for a full account of the cosmic origin, he nonetheless laid the foundations for both material science and theology—an influence that has proved profound.

Book V — The Core of Metaphysics (30 chapters)

This book confirms that Metaphysics is a philosophy of the cosmic origin. It employs the logical principles of First Philosophy (material philosophy) to study and analyse the non-material origin of the cosmos — cause and factor — together with their related categories.

Chapter 1 examines the six different meanings of the term “origin”. Inspired by this, I designed a “origin coordinate system” with a zero-point reference of space and time. (Samo Liu, 2025h)

Chapter 2 treats the four kinds of cause:Formal cause, material cause, efficient cause, final cause, and the concept of “cause” itself.I believe that modern physics has provided some preliminary answers (Samo Liu, 2024g; 2024h; 2024i).These four types of “causes” treat both the original “cause” and the various “factors” as causes themselves; this is precisely what Eastern philosophy refers to as “yin-yang” and “cause-factors”.

Chapter 3 discusses six explanations and meanings of "factor" (element, constituent).These six meanings and interpretations are as follows: basic composition; primordial elements; fundamental components; indivisible entities; “point”; “category” and “boundary”.Aristotle did not analyze things in accordance with the Eastern philosophical concept of "yin-yang", He failed to distinguish clearly between the “causes” and “factors” related to the concept of origin and substance.

Chapter 4 sets out six theses on nature (innate endowment and properties).It is believed that “innate nature” is the source of all the changes and movements in the natural world.Analyzed using the fundamental concepts of Eastern cosmology, this approach reflects the relationships between the "Substance" that constitute existence within the universe.

Chapter 5 An analysis of the four interpretations of necessity (inevitability) is presented, These four explanations are: “Conditionality,” “Compulsion,” “Lack of alternative options,” and “Empirical evidence and conclusions.”.These four kinds of explanations reflect the direction of the "origin" and "substance" of the universe.

Chapter 6 studies the thesis of the "primal One" (yuan-yi), A, B, C...1, 2, 3... Discuss the topic of '1' using various substances.Simply put, it is similar to the concept of the " unlimited" in Eastern philosophy., in my terminology, the zero-point origin. Existence describable as greater than zero is called the "many."

Chapter 7 asks what "is" (being) means, The concept of “absolute existence” and “attributive existence” is explored from four different aspects. With present knowledge we may affirm that "absolute

existence" comprises the existence and transformation of both material and non-material being, while "attributive existence" is the existence and expression as apprehended by humans — the Taoist Dao and De. (Samo Liu, 2024i; Liu Hongjun & Samo Liu, 2021d)

Chapter 8 investigates substance/ousia and criticises earlier accounts, Although the definition of "ontology" is not fully clarified, it makes one thing clear: humans invented language, writing, numbers, and mathematics to explore the origins of matter and humanity. I take substance to be origin itself; quantum mechanics and relativity, thermodynamics now provide knowledge pertinent to the cosmic origin and to substance. (Samo Liu, 2024g)

Chapters 9–10 (“same/different,” “opposite/contrary”) examine contradiction and change in what exists.Research shows that “existence” is only relative in terms of existence and change; there is no such thing as “opposition.” Only “directionality” can be used to indicate “opposition.” However, “existence” and “directionality” are different in “variety”.

Chapter 11 (“prior”/“posterior”) considers the relativity of processes of existence. Evidently, ancient Greek philosophy lacked a systematic inquiry into the origin of time; such inquiries exist in Buddhist and Taoist philosophy. (Samo Liu, 2025c)However, two key logical principles are mentioned here: the “initiator” of a change must initiate that change themselves, and the “substance” possesses a “potentiality” that precedes any actual manifestation.

Chapter 12 treats actuality and potentiality in relation to the efficient cause, discussing act, agent, impotence, power, etc. Although in Physics Aristotle demonstrates the perceptibility of existence (Aristotle, 2019; Samo Liu, 2025i), this aspect is not elaborated here, This clarifies a logical principle: the proper definition of 'ability-potentiality' is the source of change in things. Eastern cosmology affirms the perception of existence as the very root of cosmic efficient causation.

Chapter 13 studies "quantity" and "quantum", It is considered as the measurement of the "attribute" and "nature" of the affairs, and space and time are also regarded as "quantum".

Chapter 14 studies "quality" and “such, ” holding that the primary sense of quality is difference in substance本体, and the secondary sense concerns qualitative change and transformation in motion/change.

Chapter 15 examines relations, This paper studies the logical relation between "number" and "potential" and "existence".comparable to Taoist yin–yang and Five Phases, and to Buddhist dependent co-arising.Modern physics shows that the relationship between non-material particles and quarks leads to the formation of atoms; the relationship between atoms leads to the formation of molecules and matter; the changes and movements of matter lead to the generation of energy; the relationship between energy and information makes people re-understand matter and human beings; it is still metaphysics.

Chapters 16–30 investigate the primordial status of a series of human-devised, knowledge-type terms — “complete,” “limit,” “from another,” “from itself,” “arrangement,” “having/undergoing,” “endowment,” “privation,” “having/being-in,” “from,” “part,” “whole/common/total,” “trimming,” “genus-species,” “fake,” “accident/attribute,” etc. — thereby pioneering the study of the origin of knowledge itself.

Chapter 28 is devoted to the study of "genus (race)", and puts forward the philosophical category of "different from genus".

Book VI — A Taxonomic Study of Reality and Existence (four chapters)

Chapter 1 proposes that each discipline should study its proper domain of existence and reality. Physics, mathematics, and philosophy are theoretical disciplines; philosophy should lead all others in reflection, and its goal ought to be the study of the cosmic origin that exists independently and is unmoving. Here Aristotle, through material-philosophical reflection, delineates the disciplines of material science, while affirming that philosophy is both the soul and the vanguard of these sciences, and the basis for inquiry into the cosmic origin.

As theoretical disciplines, mathematics and physics may serve as tools for this theology (study of the unmoved principle). If the divine exists anywhere, it must be found among these things. Thus, philosophy is the first discipline (prime academic study), not (only) First Philosophy. First Philosophy is the logical method of "using the known to study the unknown," which I call material philosophy. Material philosophy is the soul of material science and also the wisdom by which the philosophy of the cosmic origin is pursued.

> From this chapter it is clear that Aristotle distinguishes the first discipline, First Philosophy, and Second Philosophy. The first discipline is the philosophy that studies the cosmic origin — the subject of Metaphysics. Hence Metaphysics is the first discipline, not merely First Philosophy. (Note: This point is very important in modern physics.)

It is emphasized that no matter what kind of thing is studied, the starting point should be the "ontology" of the thing；The “soul” is a natural phenomenon; to explore the nature of such phenomena, we must consider how the soul is related to matter and existence. The soul cannot be separated from matter and existence.

Chapter 2 classifies four kinds of actual existents and argues that accidental being cannot found a special art. It also discusses the relations among the accidental, the usual, and the necessary.It is argued that the logic behind “potential being” and “actual being” is one of conformity to nature.

Chapter 3 further traces the causes of accidental happenings, using relations among A, B, and C in a manner comparable to Taoist generation-and-restraint within yin–yang and the Five Phases, concluding that any regress must ultimately consult the Four Causes: material, final, efficient, and formal.

The opening sentence of this chapter poses a thought-provoking question: the principle and cause of phenomena arising and ceasing without undergoing a process of birth and death “Should” exist. But does it really exist?

Chapter 4 discusses propositions of truth and falsity, arguing that so-called "truth" is human cognition of what actually exists — and may not coincide with the actuality. I understand this as a discussion of the reality of natural existence and the probabilistic character of science: humanly made knowledge and information are human understanding, not necessarily nature's reality, and human inquiry is unending.

Book VII — On Substance and the Cosmic Origin by the Method of First Philosophy (seventeen chapters; the core of Metaphysics)

Chapter 1 asks: What is the cosmic origin or substance? How does it exist? How do its quality and quantity change? Such inquiries form the basis upon which humans, by means of knowledge and information, can analyse and judge.

The cosmic origin or substance may be called the first primitive: primitive in definition, in the order of knowing, and in time. In Aristotle's day there was no concept of zero; in my work I designate it as 0, the beginning — from absolute zero, light and light-speed, and the zero of cognition. Zero is the substance and the cosmic origin, the origin of the Cartesian coordinate system.

Chapter 2 lists diverse Greek views of substance and raises theses on cosmic substance. Evidently, the various Greek doctrines of substance lack the systematic and logical coherence found in Taoist and Buddhist cosmology.

Chapter 3 employs four objects — "what-it-is" (quiddity), the universal, genus, and the substratum — and takes "matter, " "form, " and the "composite individual" as substrates for investigating substance. He argues that if one must choose, it is better to take form rather than matter as substance; to take form as substance is most captivating — and most perplexing. In my writings I hold: within the material universe, both material and non-material are the universe's substance. "无名天地之始;有名万物之母(untranslation.)。" Quantum mechanics and relativity indicate that the scientific substance of the universe is non-material information and energy. (Samo Liu, 2024g; 2024h; 2024i)

Chapter 4 studies the relation between "what-it-is" and substance, i.e., between humanly posited definitions and natural origin. Human definition — what-it-is — is our attempt, with scant knowledge, to seek the grand purport and truth of the cosmos; it remains in a state of "not-knowing" or "insufficient knowing."

Chapter 5 analyses the compound of subject and attribute, concluding that we cannot determine the "what-it-is" of substance, nor can we strictly define it — categories outside substance cannot define it independently, for substance is nature itself. Knowledge may investigate it, but only by continually approaching it.

Chapter 6 asks whether a thing and its "what-it-is" are the same; they are not. Human understanding is an accumulation of knowledge and information; "what-it-is" belongs to nature itself and to humanity's ceaseless quest — an eternal process of existence and reflection.

Ancient Greek (and other) philosophers often deemed their own "understanding" correct and others' incorrect — a propensity born of human reflective endowment, and a kind of human "trouble."

Correctness should be judged by the probabilistic workings of science: high-probability claims may be correct; low-probability claims may not be.

Thermodynamics, relativity, and quantum mechanics corroborate Taoist and Buddhist cosmologies: yin–yang Wuji, yin–yang Taiji, Five-Phase generation and restraint, dependent origination, the Middle Way and balance — as well as the Greek notions of the "primal One" and "flux."

Chapter 7 studies modes of origination: the cosmos's natural creativity and spontaneous generation without deliberate sequence; and artificial making, including human intention and fabrication — what I call human subjective consciousness: artefactual existence. (Liu Hongjun & Samo Liu, 2020; 2021a)

Ancient Greek philosophy does not exhibit a systematic doctrine of the Taoist acting through non-action or the Buddhist emptiness of the five aggregates — the felt presence of "void" and "nothingness."

Nevertheless, Aristotle also holds that before human making there is material existence; human making employs matter, and the created status of matter can be described through privation. What is privation? Greek thought lacked a systematic account; Eastern philosophy treats it, and modern physics has discovered knowledge and information pertinent to it.

Chapter 8 is perhaps the most intriguing chapter in Metaphysics, fully displaying Aristotle's material-philosophical logic of using the known to analyse the unknown. He holds that creation must have a starting-point, an antecedent cause, and a resultant effect.

He argues that form does not first exist independently; the creative efficacy of form is vested in, or depends upon, individual existents.

I hold that form is the manifestation of existence in space; the creative principles of formal cause within space remain insufficiently explicated — modern science suggests that privation is a contradictory relation between energy and information. (Samo Liu, 2024)

Chapter 9 examines three modes: artefaction, spontaneous generation, and the natural generation of the cosmic origin or substance.

Chapter 10 defines part and whole, and posits temporal issues of "prior" and "posterior" in the process of existence. In human life, "soul" and "body" are a simultaneous unity; otherwise there is death. He does not state that all existences are co-present in yin–yang and are sentient (Perception rather than sensation) and alive — a gap in Greek thought.

Chapter 11 investigates the forms of "category" and "part" in relation to the composite entity; it holds that the human soul is the primitive substance, while the body is matter — the composite entity. Chapter 12 continues with the human as the lens for studying substance, emphasising the indefinability of substance because of hierarchical differences in genus, species, and form. Chapter 13 examines substance via the composite of substrate and "what-it-is," considering substance as individual and as matter, and concludes again that substance admits of no strict definition.

Chapters 14–15 criticise as absurd the doctrine that "forms/ideas" (various eide) are substances.

Chapter 16 studies the potentialities of substance and discusses the relations among the primal One, actuality, principles, elements, causes, and substance. It introduces an inquiry into perishable existence (material) and imperishable existence (non-material) as modes of substance.

Chapter 17 restates substance from another starting-point. In essence: substance or the cosmic origin is nature. Yet the universe has endowed humans with an innate drive to ask “how so?” — why this is this. The key to our inquiry lies in elements(factors, element) and causes (causal, efficient, final). The most crucial pursuit is the latter: cause. The formal cause may be the primal cause for grasping cosmic space; the efficient and final causes are those by which the factors of existence become the substance of matter. This is the philosophical system of the origin of the universe, with Einstein's theory of relativity being merely a relativistic theory of material motion based on Newtonian mechanics, and thermodynamics, electromagnetism, strong force, and weak force also being the basis of their respective relativistic theories.(samo Liu, 2025i)

Modern Physics has discovered the substance and energy's ontology, motive force, purpose, blurring their form and process. (samo Liu, 2024g)

Book Ⅷ — On Matter and Form (six chapters)

Across these six chapters, Aristotle applies material philosophy to the study of the cosmic origin, emphasising that causes (yin-like), principles (relations of causal conditions; yin–yang and the Five Phases), and the elements of substance (factors/elements; yang-like) are the true objects of inquiry into the cosmic origin.

Chapter 1 holds that the "material substrate" of things is also substance, echoing the Tao Te Ching idea that “有名万物之母 (untranslation). ”It implies that the atomic ontology is energy, and atoms can give rise to molecules, cells, etc.It can be understood that the "ontology" is the basic structure of "existence", and the mutual relationship and the direction of change between them produce "existence" and "matter".

Chapter 2 argues that although matter is "actual being," it is a potential substance, whereas "actualised substance" is the formal cause related to space. This reveals the fundamental primacy of the spatial formal cause, and it analyses the definitions of a thing's form and its composite individual: it is the spatial form and structure that make "what-it-is" become "this." To this day, we still lack a full understanding of the formal cause, relativity and quantum mechanics each maintain their own "philosophy of space." If physics forgets the 'academic soul', contradictions are bound to arise. (Samo Liu, 2025f; 2025b)

This chapter reveals that the "matter" as a three-dimensional form contains "energy" and "information", and that the "yin-yang duality" and "three-phase unity" lead to the "existence" itself and the mutual relations and changing directions among them.

Chapter 3 contends that by analysing form and the composite entity,we still cannot fully clarify the many kinds of substance, perishability, processes of perishing, and imperishability; neither "number" nor mathematics can resolve these issues.

Chapter 4 distinguishes "remote matter" and "proximate matter," holding that every natural substance has its own proximate matter and efficient cause; he illustrates this with the example of human sleep.

Chapter 5 discusses changes in matter。

Chapter 6 addresses the vexed contradiction of the "one" and the "many," concluding that all "non-material origins of things" may be called the "primal One." In my writing I call this non-material existence; it may also be termed energy and information, absolute zero, absolute space, and light; Eastern philosophy calls it Wuji and Taiji.

This chapter can be understood as: although Aristotle did not apply the principle of cosmic origin of the Eastern philosophy, his research conclusions are similar to the Eastern philosophy.

Book IX — On Potentiality and Actuality (ten chapters)

Chapter 1 investigates potential power and actualised power, with the key lying in understanding the active and passive dynamics of potentiality. In my view, modern physics has resolved this problem. Material philosophy has led material science in the vanguard, enabling humanity to recognise that the primitive being of substance is mechanics — the yin–yang transformations of "information," "matter," and "energy." (Samo Liu, 2025f)

Mechanics is the relationship of interaction (attraction-repulsion) between "existences" (or within their own structures); this relationship reflects the fact that "existences" possess the ability to perceive.

Chapter 2 studies rational potentiality and non-rational potentiality. Only humans possess rational potentiality grounded in subjective consciousness; humans have a "soul, ” with dual functions of sensation and perception. Yet all categories of existence and their origins also possess perception, belonging to the “acting through non-action无为而为” and “emptiness of the five aggregates五蕴皆空” — that is non-rational potentiality. (Samo Liu, 2025i)

Aristotle treats existences beyond the human as “soulless,” separating them from the "cosmic origin" — a stance rooted in material philosophy.In fact, in Section 3 of Volume 3 of Physics, he had already deduced that 'existence' possesses perception—a conclusion he himself found hard to believe.(samo liu,2025i)

Here the difference between Eastern and ancient Greek philosophy emerges. Eastern cosmology holds that the "existence" of humans and all things bears a perceiving "mind" and "soul"; only humans and animals (cellular beings) have the faculty of sensation, an explicit mind and soul, and uniquely humans possess logical reasoning and the innate endowment of language, script, and number. Humanity should be grateful to the cosmic divine.

Human existence is an exceedingly rare "low-probability" event in the universe — the result of human striving — and we should also be grateful to ourselves.

Chapter 3 analyses the Greek notions of can, cannot, and potentiality. Using human sensation as an example, it argues that can and cannot are only matters of human sensation and knowledge, whereas potentiality belongs to cosmic nature — the "achieved in concealment" of acting through 无为而为 and 五蕴皆空。

Chapter 4 asserts that whatever is possible will exist — what we today call a “high-probability event.”

Chapter 5 asks how potentiality is acquired and how existence is actualised. A key condition discussed is will or desire. Here only human will or desire is treated; Eastern cosmology maintains that existences in the universe and in space all possess perceiving “will.” This is the true potentiality of cosmic nature, like mechanics. (Samo Liu, 2025i)

This chapter also considers potentiality to be non-rational; it may belong to living beings or to "non-living" things. Aristotle does not probe further — showing a gap in Greek philosophy.

Chapter 6 studies the nature of actualisation, arguing that one must address propositions about the potentiality of motion/change in order to study the actualisation of existence, and holding that activities such as the "infinite" and the "void" can never be fully actualised processes.

Evidently, to infer the "void" and the "infinite" of motion/change and potentiality using the logic of material philosophy — rather than Eastern cosmology’s systematic knowledge — cannot derive the Eastern notions of 无极Wuji and 太极Taiji.

The greatness of Aristotle’s logical philosophy lies here; it is not a matter of right or wrong. At this point one can see his thought clearly pointing out three philosophical routes, separating philosophy into: *a theological*神学 *route;*

*a material-philosophical*物质哲学 */ logical route; (First Philosophy)*
*and a scientific-philosophical/Material Science*科学哲学/物质科学 *route of differentiated disciplines within material science.(Second Philosophy)*

Chapter 7 uses material-philosophical logic to ask when a thing is potential and when it is not, concluding that things are not potential at every time and moment. He did not realise that the physics he founded shows the process of "cosmic nature" to be perpetually in dynamical, mutually perceptive transformation — i.e., perpetually potential.

He further holds that in a potential thing, thought’s efficacy makes it a fully actualised existent; and that things generated by innate impulse, absent external impediment, are potentially all that they can be.

It can be understood as: he studies the 'potential' probability of success, with some succeeding and others failing.

He also analyses the relations among “earth, ” “air, ” and “fire, ” but omits the Eastern concepts of “metal, wood, water, fire, earth” and their non-material attributes, as well as the Five-Phase五行 relations of generation生 and restraint克 — relations that happen to accord with mechanical relations in modern physics. (Samo Liu, 2024i, 2025f)

Chapter 8 claims that potentiality precedes definitions and formulae, for potentiality belongs to nature, while definitions and formulae are human constructs.

He also argues that the before-and-after of the "process of existence" (time) is a form of human sophistry. He clearly recognises that the "concept of time" is a human definition imposed on nature, yet does not fully explicate this — a deficiency in Greek studies of the "process of existence" that has become a "regret" in modern physics. (Samo Liu, 2025c)

Even so, he still holds that philosophy should prioritise inquiry into cosmic substance.In this sense, “actualization” precedes potential.

He deems that human sensory functions are actualised by action, and intellectual functions by product.

He further distinguishes a mode of existence that is everlasting and imperishable from one that is perishable; the perishable contains contradictory opposing factors and thus cannot abide. But what is “everlasting and imperishable”? The Greeks took the heavenly bodies as “eternal,” yet these too change.

Studying the cosmic origin with material-philosophical logic naturally leads towards a “theological philosophy.”

The chapter concludes with a prospect: Academically, it will be more scholarly, There will be a higher degree of motion change in the dynamic variable form; actuality evidently precedes potentiality and all principles of motion/change.

Chapter 9 And Chapter Ten continues with is and is-not, good and evil, true and false. Human judgments about nature are always at some distance from nature itself.

2.2. Conclusions of Metaphysics: "Existence" in a Philosophy of the Cosmic Origin

Book X examines the "primal One," "opposites," and "intermediates," in ten chapters.

These chapters continue to analyse ancient Greek notions of the cosmic origin or substance.

In Greek philosophy, the concept of the cosmic origin encompasses both rational knowledge and sensible (perceptual) knowledge.

In Eastern cosmology, diverse schools likewise combine perceptual and rational knowledge, all grounded in the I Ching as the fundamental system, with the Tao Te Ching systematising these insights (Liu Hongjun & Samo Liu, 2021d).

Buddhist cosmology also formed schools based on the dialectic of "emptiness and being," "cause and factors," and dependent origination; the Diamond Sutra and the Heart Sutra systematised this body of knowledge (Liu Hongjun & Samo Liu, 2024). It then merged with Taoist learning (Liu Hongjun & Samo Liu, 2020) to form an integrated philosophical system of cosmic origin.

Aristotle sought, by the logic of material philosophy, to dialectically appraise and summarise Greek thought. The result was the development of theology, First Philosophy, and Second Philosophy; scientific philosophy advanced rapidly, yet certain tensions of modern physics were also thereby engendered.

Absent the knowledge of thermodynamics, quantum mechanics, and relativity, there is still no adequate basis for adjudicating philosophies of the cosmic origin. Energy science and information science have supplied new knowledge and information, calling for a rethinking of "space and time" and of "existence" within them. This merits the attention of the academy.

Human history is created by humans; the history of the universe is what humans conceive and forge through language, script, and number. Lacking the numeral "0" at the time, human expression in language, script, and number was incomplete; thinkers like Aristotle were needed to lead human reflection (Samo Liu, 2025h).

Today mathematics has not only "0," but also the Cartesian coordinate system with 0 as origin, along with the calculus of Newton and Leibniz—constructed humanity's mathematical edifice and enabling us to unite knowledge of the cosmic origin with modern physics in a framework for the origin and substance of the cosmos.

Chapters 1–2 study the "primal One," i.e., the concept of Wuji in the philosophy of cosmic origin. Proceeding by the logic of material philosophy from the perspectives of "material existence" and "non-material existence," Aristotle could not derive the systematic Eastern results of Wuji, Taiji, yin–yang and the Five Phases, balance, causes and factors, dependent origination, and the Middle Way.

Both Eastern and Western philosophy once called the "cosmic origin" the "One," at a time when there was no numeral zero. The cosmological ideas of "emptiness" and "nothingness" thus could not be clearly expressed (Samo Liu, 2025h).

Chapter 3 treats "the one and the many." Interpreted through a philosophy of cosmic origin, he is essentially probing the existence and the scales of "0" and "non-zero numbers." The issue recalls Diamond Sutra Chapter 11, where the Buddha and Elder Subhuti discuss whether the grains of sand in a single Ganges are "many," or whether the sands of that many Ganges rivers are "many."

Here arise such notions as "the single and the collective," "opposites," "pairs of opposites," "relative," "composite substance," "same," and "different," especially "same in genus," "different in genus," "same in species," and "different in species."

In my essay on the nature and form of "0," I propose five philosophical categories of cosmic existence (Samo Liu, 2025h):

Yin–yang Wuji: Absolute zero, absolute space, light: an "absolute infinity" of living existence, without metrics of size or temporal process-To be more precise, it’s not that such knowledge doesn’t exist; rather, it is beyond the ability of human knowledge to define. It can only be described as “infinite”. The remaining four categories belong to yin–yang Taiji:

Dark matter/ dark energy - knowledge is insufficient; it is unclear whether this aligns with particles–quarks as the same genus or species. Both are non-material and cannot be expressed by three-dimensional metrics or ordinary temporal scales. Quantum mechanics introduced Planck time and the Planck scale; M-theory introduced the philosophical schema of "point, string, brane." I suggest interpreting these by the non-material perspective of the cosmic origin.

Matter: Humanity's principal body of scientific knowledge, encompassing local stars and galaxies. Yet we still do not know the true extent of space, how many galaxies there are, how many stars exist, let alone the number of atoms and molecules. The infinitely large and infinitely small thus arise.

Humanity has invented coordinate systems, calculus, and exponential expressions. If our knowledge becomes sufficient, material existence—however large or small—can be expressed; and where the human brain cannot compute, we have built computers. We do not fear calculation or expression; what we lack is knowledge.

Present knowledge remains largely within the fourth category: matter. The material-philosophical logic of "using the known to study the unknown" is still a great human achievement. Thermodynamics, relativity, and quantum mechanics have clarified the two ends of "matter":

The substance of "matter" originates in non-material energy and returns to energy. Whether its kinetic energy reaches light speed or not, it exists in the form of energy and, in motion, dissolves into energy.

With such knowns, we may supplement Chapters 4–10 on "primal One," "opposites," and "intermediates," as follows:

Material existence: the fourth yin-yang philosophical category, the sphere of human life and knowledge, atoms, molecules, and cells.

Formal existence: described by 3-D coordinates and calculus; smallest scale uses the Planck scale as the 0 origin; largest scale uses light-years or parsecs; practical units include metre, decimetre, centimetre, millimetre.

Motive cause: a thing's sensitivity to forces — mass to gravitation; electromagnetic properties to EM force; micro-structure to strong/weak forces; existence to the equilibria of thermodynamics.

Final cause: the Middle Way; balance; fairness; symmetry.

Formal cause: we now understand atomic structure clearly; have advanced in cellular structures and information; we can classify atoms, molecules, plant cells, animal cells, and human cells; yet the causal knowledge of the "forms"(space) of all beings remains incomplete (Liu Hongjun & Samo Liu, 2020; 2021a).

Expression of the process of existence: years, months, days, hours, minutes, seconds — a temporal scheme of Earth within the solar system, created by our ancestors, and suitable chiefly for "us." Should there be "others" in other systems, they would not necessarily (indeed, almost certainly would not) describe time thus. Time is a human-made, non-material knowledge system.

Material existence II: the fifth yin-yang philosophical category, the realm of cosmic stars and galaxies.

Formal existence: 3-D coordinates; smallest scale: light-year/parsec; largest scale: "infinite," signalling our limited knowledge and perhaps an ultimate unknowability of how many galaxies exist in the "boundless" expanse.

Motive cause: as in the fourth category.

Formal cause: clear understanding within the solar system; partial advances regarding the Milky Way; scope for galaxies, clusters, and superclusters; awareness of stars, satellites, white dwarfs, neutron stars, and black holes — yet cosmic knowledge remains far less clear than our knowledge of terrestrial beings.

Process of existence: can be denoted by a "kalpa," about 4.32 billion ordinary years — likewise human-made knowledge.

Non-material existence I: the third yin-yang philosophical category, the domain of quantum mechanics, particle.

Formal existence: non-material, non-three-dimensional; expressible with a 0-origin coordinate frame; think via M-theory's "point–string–brane"; largest scale: Planck scale; smallest: "0," to be grounded further once dark matter and dark energy are clarified.

Quantum mechanics has classified particles and quarks.

Motive cause: non-material perception to force; EM attributes to EM force; structural attributes to strong/weak forces; existence to thermodynamic equilibria.

Final cause: as in the fourth category.

Formal cause: unclear; we can, however, affirm "non-material" and borrow M-theory's "point, string, brane."

Process of existence: Planck time — again a human-made knowledge.

Non-material existence II: the second yin-yang philosophical category, the domain of dark matter and dark energy.

Knowledge here remains unclear: The conclusions made by the logic of combining material philosophy with cosmic origin philosophy.

Non-material existence III: the first yin-yang philosophical category, the domain of absolute space, absolute zero, and light.

This category is concluded by integrating Taoist, Buddhist, and ancient Greek cosmologies with modern physics and dialectical materialism. It marks humanity's ultimate pursuit of cosmic knowledge and information, a necessary field of inquiry for human existence — and the unfinished enterprise of Metaphysics.

The above conclusion comforts Aristotle: if there is a "philosophical theory of relativity" in physics, it is the Metaphysics.

2.3 Induction in Metaphysics on the Cosmic Origin

Book XI offers brief summaries of Physics and of each book of Metaphysics (twelve chapters).

Chapter 1 asks which disciplines, or what kind of discipline, may be called wisdom.

Humans are intelligent matter (Liu Hongjun & Samo Liu, 2020); all knowledge and information are manifestations of human wisdom. Language, script, number, mathematics, coordinate systems, and science are tools for expressing that wisdom.

Before Aristotle, "philosophy" could encompass many bodies of knowledge; he classified them into distinct disciplines. Today, philosophy, mathematics, physics, and others have each contributed to studying the cosmic origin. Thermodynamics, relativity, and quantum mechanics have identified the origin and substance of matter (the atom) and have provided scientific grounds for the claim that both matter and humanity arise from "emptiness" and "nothingness." This marks a move from material philosophy to an energy philosophy, indebted to Aristotle.

Philosophical reflection still leads all disciplines, yet it depends on their research and exploration—across both the social and natural sciences.

Humans have created computers and robots—endowing machines with a "soul" and "mind"—and thereby moved from material philosophy into an information philosophy. In this way, we can also inquire into the mind and soul of the cosmos and of humankind. Although we still cannot confirm "what that is," the cosmologies of the cosmic origin left by our ancestors, together with Aristotle's logic of using the known to investigate the unknown and with dialectical materialism, can be linked with

modern physics to generate a new philosophy (Samo Liu, 2025f)—one that requires the participation and verification of multiple disciplines.

Chapter 2 discusses the ontological relation and principles between "actual existence" (matter) and the "primal One" (non-material), introducing the ideas of the point and "1" as ontologies, along with the notion of composite entity (things composed of matter and form).

Material philosophy cannot express the conclusion that every existence—not only the human—possesses perception and "lives" throughout a temporal process until that existence ends, even though in Physics Aristotle already deduced that all "existences" have "perception." (Aristotle, 2019; Samo Liu, 2025i)

Chapter 3 considers how certain affairs are assigned to a discipline—this becomes the classificatory logic of the material sciences—and identifies philosophy's theme as the common realia of disciplines and their basic correlates. Chapter 4 holds that physics and mathematics are branches of philosophy. Chapter 5 analyses the paradoxes of "both is and is not" within human knowledge and defends the law of contradiction.

Chapter 6 criticises Greek doctrines that violate the law of contradiction; Chapter 7 regards philosophy as an inquiry into theology and the forerunner of the other sciences; Chapter 8 distinguishes what is by nature from what comes to be; Chapter 9 discusses the actualisation of potentiality and motion, holding that change is the process by which potentiality tends toward actuality.

Chapter 10 argues that "the infinite" cannot be realised in the material universe, and demonstrates that sensible bodies possess only relativity in respect of distance, motion, and time—what may be called "the infinite." Hence, in my analysis of the cosmic origin I divide "existence" into five categories, each beginning from 0 and terminating at some number.

"The infinite" signals the "inability" of the human domain of knowledge; thermodynamics, relativity, and quantum mechanics allow "existence" to be expressed via limits, overcoming this impotence of human wisdom.

The substance of the cosmic origin—Wuji无极 or the primal One元一—is absolute space, absolute zero, and light, the Primordial Lord of the cosmos. It cannot be expressed by human temporal process or by metrics of form; it is the infinite balance of yin and yang in cause and factors, the substance and first cause that brings forth the universe .

Chapter 11 analyses modes of change—motion and transformation—proposing three types: generation and corruption; complete generation and complete corruption; partial generation and partial corruption; motion is a genus of change.

Chapter 12 argues that for substance and relation, neither motion nor the categories of "active" and "passive" can have a motion-of-motion or change-of-change; motion belongs only to the categories of quality, quantity, and place. Four arguments show that there is no motion of motion, nor change of change—an insight akin to Zhuangzi's "有长而无乎本剽 (untranslation)." Yet in articulating "space, " "time, " "Wuji, " and "Taiji, " the account is less systematic and clear than that of Wenzi, Liezi, or Zhuangzi (Samo Liu, 2025c).

He holds that the thesis "substance is without motion and change" was later misunderstood; what he meant is that the "rest" of substance marks a privation in Greek understanding.

Book XII studies the universal cause and the Prime Mover (ten chapters).

Chapter 1 states that the theme is substance and that the inquiry concerns its principles and causes.

If the universe is a whole (a complete entity), then substance is its primary part; next come quality and quantity, which are merely endowments of substance and modes of change.

He divides substance into three classes: two sensible substances—one eternal, the other perishable—and one non-sensible, unmoved substance. Analysing the Greek ontologies through material philosophy exposes the inadequacy of knowledge for concluding on origin and substance. Therefore, drawing on modern science, I synthesise five ontological categories (Samo Liu, 2025h).

Chapter 2 uses material-philosophical logic to derive matter as a third thing, and to assert three items among causes and principles: definition or form; the corresponding privation of that definition/form—the two forming a correlative pair; and third, matter.

This readily yields the conclusion that information and energy compose matter.

Here he adds one more mode of change—ontic change—making four types in all.

Chapter 3 summarises three kinds of substance—matter, natural substance, and composite individual—and four modes of origination: by techne (art), by nature, by chance, and spontaneously.

Chapter 4 concludes that the classes of principles/causes are either four (form, privation, matter, efficient cause) or three (form and efficient cause united), and that efficient causes may be proximate or remote, the remote being the universal cause of things. Efficient causes may be internal or external: natural products arise from external causes; products of thought do not.

Chapter 5 argues by logic that the substance and causes of all things are analogous to the human soul and body. He posits a concept—possessing all four causes, grounded in substance, The concept of 'non-ordinary people' originating from a primordial general cause can be understood universally. thereby laying a philosophical basis for a personalised deity.

Chapter 6 deduces, prior to all things, an "eternal, unmoved" unchanging substance, and identifies the first cause as the universal cause of all causes that bring about actual existence; thus he establishes the philosophical basis of a "God of Nature."

What is this “first cause第一因” or “universal cause总因”？ Even today, with knowledge of absolute space and the light of absolute zero, we cannot say clearly. We only know that among all existences, humans alone possess subjective consciousness and have created a knowledge system of language, script, and number—devised for our survival and existence.

Chapter 7 adduces the stars as evidence of an “eternal Prime Mover，” initiating change through reason, and praises the "goodness" of the God of Nature—pure thought (non-material), independent of the sensible world; such a substance本体 must be without change and immutable.

This chapter explains and praises the God-“personalized” version of the cosmic deity in a very beautiful language.

Chapter 8 holds that Greek philosophy and myth alike recognised the divinity of the eternal natural substance; the cosmos is one, and the Prime Mover is one.

Chapter 9 discusses mind, reason, thought, the human mind and the divine mind, and the identity of thinking with its object.
Chapter 10 treats the "good" as the disposition of the God of Nature, standing above all things and providing order. The God of the cosmos created humanity and all beings; to call this merely "good" is inadequate.

Book XIII investigates mathematical objects and forms/ideas (ten chapters).

Chapter 1 surveys disagreements among Greek theories of number and ideas, and distinguishes two kinds of non-sensible entities: mathematical objects and forms.

Chapter 2(1) presents seven arguments to show that mathematical objects cannot constitute an independent substance either inside or outside sensible things.

The sixth argument holds: a subject (three-dimensional) can be actual (material), but abstract points and lines cannot be actual (they are non-material). Hence, the M-theoretic notions of point, string, and brane should belong to a non-material philosophical domain (Samo Liu, 2025h).Similarly, research in mathematics beyond three dimensions is permissible, but applying this academic knowledge to physics is a philosophical farce, violating the principles of philosophy.This is discussed in another article (Samo Liu, 2025k).

Chapter 3 maintains that mathematical objects cannot exist independently in actuality, though in thought they may be treated as separable. He notes relations among optics, acoustics, and mathematics—number and line are special endowments of light and sound, and mechanics should likewise be studied—thus initiating a line of non-material mathematical inquiry.

Chapter 4(2) critiques Greek doctrines of forms/ideas and summarises their provenance; Chapter 5 continues the critique, including of Plato.

Chapter 6(3) offers a concluding critique and discussion of treating number as substance; Aristotle uncovers a major defect of Greek philosophy. Yet, because he pursued the cosmic origin through material philosophy, he himself was also caught in this "major defect."

The "defect" is this: numbers and mathematics are humanity's crucial informational tools—our most precise instruments for studying and understanding the cosmos and its origin. Without number, the human toolkit of language–script–number would be incomplete; without geometry, coordinate systems, and calculus, modern scientific progress would not exist.

Nevertheless, number and mathematics, though arising from nature, are human creations for knowing nature; they are not themselves nature. To take "number" as the "cosmic origin" or "substance" is the fatal defect of ancient Greek philosophy—and a key difference from Eastern cosmology of the cosmic origin.
Eastern cosmology takes origin and substance to be the "existence" of emptiness and nothingness, and may also call substance the "One," but it does not entangle itself in number—for there was then no numeral "0"; the East awaited the advent of zero.

"Zero" is a monumental human creation and discovery. (Samo Liu, 2025h)

"Zero" is the "universal cause" and "primordial factor" of the cosmic origin. The substance of all "existences" in the universe begins with its own zero; only the "universal cause" and "primordial factor" may be infinite, called the absolute "0."

Chapters 7–9 continue the critique of Plato and other Greeks who take "number" as origin, puzzling over how the unit could ground differences in quality and quantity, and raising the profound question of "the unrealised infinite" and, if it is finite, "where its limit lies."
Here arises a great and fascinating philosophical problem: What is a "point"? How is a point created? Who can answer?

Chapter 10 discusses whether the first principle is particular or universal, concluding that potentiality cannot be separated from actuality, and the universal cannot be separated from the particular.

This volume of study can vaguely convey a sense of a question: both 'existence' and 'being' are the unity of yin and yang, and are alive.

Book XIV continues Aristotle's critique of Greek theories of forms and numbers (six chapters).

Chapter 1 argues that opposites cannot serve as the first principle. Accordingly, existence and change in the cosmos belong to the causal correlation (cause and factor) — the unity of dependent origination and yin–yang. Matter and humankind alike partake of this unity; they are not "existence" and "anti-existence," "factors" and "anti-factors," nor "matter" and "anti-matter" categories or attributes.

It shows that the existence of the universe is absolute, and there must be something "absolute" described by human beings; however, the existence of materiality is only "relative" in change.

Chapter 2 maintains that the eternal substance cannot be expressed through "elements" and can only be described, in terms of potentiality, as a class of "non-being" existence (non-material).

Here is a conclusion that has been overturned by modern physics. He stated: "Non-being" can never be proven as "being." The reason lies in the absence of the "Yin-Yang" theory of "The One" and "wuji无极" in ancient Greece, which lacked the distinction between energy and information.That is to say, the "god" expressed in Metaphysics must be alive.

The question is raised here: the potential ontology does not become actuality by itself, the ontology is not one but many, and the "relation" among them is confusing.

Chapter 3 continues to refute the theory of number as an independent substance, reiterating that points, lines, and planes cannot be independent material entities. This inspires us to think that "points, strings, and branes" might instead represent non-material forms of being.

Chapter 4 criticises the absurd notion that "the Good" is the first principle. Chapter 5 further denounces the claim that "numbers" are elements or causes of things, while Chapter 6 outright rejects numerology as the cosmic origin.

At this point, the Chinese edition of Metaphysics comes to a close. Yet Aristotle's material-philosophical inquiry into the cosmic origin has not ended—it continues to this very day (Samo Liu, 2025a). Let us persist in contemplating his scholarly legacy (Samo Liu, 2025b; 2025c; 2024i).

2.4. Induction

Metaphysics represents Aristotle's systematic summary and critique of the ancient Greek philosophy of the cosmic origin—but it did not include the knowledge traditions of the East.However, his philosophy implies the knowledge of the East.

Thus, Aristotle's study of the cosmic origin is incomplete, though his logical framework of material philosophy is flawless, awaiting the enrichment of later knowledge.

In Physics, he deduced the mutual perception among existences (Aristotle, 2016; Samo Liu, 2025i);

In Metaphysics, he derived the concept of "existence" as a composite possessing quasi-human characteristics, and demonstrated that taking "number" as "substance" was inappropriate, while

"points, strings, and membranes" belong to the non-material realm —Its spatio-temporal logical judgment- conclusions remarkably consistent with the Eastern philosophy of the cosmic origin.

This paper does not seek to emphasise differences between Eastern and Western cosmologies; rather, it holds that the I Ching, ancient Indian mythology, ancient Persian mythology, and ancient Greek mytho-philosophy share profound commonality. Perhaps humanity's ancestors all passed through similar epochs—times when people perceived the world through intuitive cognition and thereby created knowledge, a stage that may be called "rational perception理性感知。" (Liu Hongjun & Samo Liu, 2021c; Samo Liu, 2025e)

2.5 Conclusion

The study of the cosmic origin is an inquiry into material and non-material existence—both belonging to the realm of human logical analysis and thus to a philosophy of man-made existence.

It is, in itself, a non-material cultural system: an informational instrument created by humanity for survival and existence, and the joint product of the human mind, soul, and brain.

Hence, the academic community is urged to pursue collective research into the existence of the mind and soul—of humankind and of all beings in the cosmos.

III. EPILOGUE

Let us praise the theological depth of Metaphysics, salute Aristotle, and honour the great scientists of the past five centuries who have elevated human thought to a theological and cosmic dimension.(Samo Liu, 2024g)

Metaphysics has created modern science and physics, and is the "ontology" of modern knowledge.Modern science has confirmed the logical inference of metaphysics.

Research Statement

This study is written from the standpoint of an engineer, reflecting on physics with the combination of Taoist philosophy, Buddhist philosophy, and ancient Greek cosmology as the origin of being in dialectical materialism.

The author claims the right to engage in this discussion, hoping thereby to offer a new perspective for resolving contradictions in modern physics.

It is not intended to influence religious or philosophical belief, and carries no authority of interpretation.

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物质与非物质的"本体"—论《形而上学》中的宇宙本原研究

Samo Liu

文章摘要

《形而上学》是世界哲学史上一部不朽的巨著，为人类探索"未知"提供了前所未有的启发，成为东西方哲学反思物质世界的基础性著作。

古希腊哲学家们提出了一些不系统、矛盾和零碎的宇宙本原和本体论概念。在《形而上学》中，这些概念被收集并综合；亚里士多德通过"已知"的物质哲学的逻辑框架分析和批判了它们。

东方哲学不仅构建了系统的形而上学体系，更在探索宇宙本原时深入探讨"有"与"无"的悖论。以《易经》为核心的道家思想，强调"有"与"无"的辩证统一，其核心理念是"道"—即变化与平衡。佛教传入中国后，其宇宙本原理论与道家思想相融合。儒家学者继而发展出融会贯通的儒佛道三教宇宙观，这一思想体系在宋代达到鼎盛（冯友兰，*2013*）。

然而，从"已知"的物质哲学中发展出来的语言、文字和数字继续主导着人类的思想表达。相关论战也从未停歇。相对论、量子力学以及三次工业革命，已将人类认知从物质科学转向能量科学与信息科学领域。这些突破性进展充分证明：物质本质上是 能量（非物质） 与物质在力学信息调控下的相互转化。

因此，宇宙与物质的起源在于信息（非物质） 与能量（非物质） 的动态互动——这种阴阳相生的存在本质，通过永不停息　地运动与转化寻求并实现平衡。从根本上说，宇宙本身是物质与非物质存在，在信息参与下共存并不断演化的体现。

本文用"已知"的知识研究并诠释《形而上学》的宇宙本原思想，"物质"是"能量"的"阴阳－本体"，"能量（非物质）"和"信息"是"物质"的"本原""本体"。

关键词：物质存在；非物质存在；运动与变化；宇宙本原；物质本原；形而上学；"本体"。

I. 文献综述

1.1 关于心灵和灵魂

人类是由物质构成的—也就是我们所说的躯体或细胞结构。然而，一个活人的身体的运动和动作是由大脑指挥的，而活人　的大脑本身又是由心灵、灵魂、思想和意识所支配的。那么，这些术语—心灵、灵魂和思想—的本原是什么呢？

这个问题涉及人类的原始存在，涉及生与死，（Samo Liu,2025d）这是宇宙赋予人类的特殊的智能和智慧，人类会辩证地 思考。这些思考涉及人类的"形而上学知识"和存在。

人类作为智慧生命体，创造了语言、文字和数字—这些表达信息的工具。这使得人类能够表达自身的存在、宇宙中万物的存在，以及自身与宇宙之间的关系，从而开启了对自我、宇宙和存在的研究。（Samo Liu,2025e）

即便没有人类，宇宙和所有生命依然存在。若没有人类的语言、文字或数字，宇宙仍会作为客观存在，不受人类主观意志的影响。然而通过创造语言和数学体系—包括语言、文字、数字、数学、坐标系和科学模型—人类在人类领域开启了宇宙自我认知的新纪元。

London Journal of Research in Science: Natural & Formal

亚里士多德开创了以已知推演未知的逻辑方法，奠定了物质哲学与物质科学的分析基础。由此人类开启了物质科学的繁荣时期，达到现代物理学的巅峰，并逐步拓展至能量与信息科学领域。人们开始研究自身细胞结构的微观组成，成功利用原子能，并发明了计算机和机器人。

从某种意义上说，人类已经成为神—创造了与自己相似的机器，称为机器人。尽管由合成材料制成，但机器人通过人类创造的软件运行。人类赋予了它们一种“心灵”“灵魂”和“思想”。

由此我们可以推断：正如人类创造了机器人及其“心智”，宇宙同样创造了人类与人类的心智。然而以现有知识水平来看，人类至今仍无法破解人体细胞的起源之谜，也无法真正理解人类心智的本质。因此，我们不妨效仿亚里士多德“以已知探索未知”的方法，通过类比推理来拓展对人类心智与灵魂的认知—进而延伸至宇宙本身的心智与灵魂。

1.2 物质与非物质

根据上述逻辑及先前研究（Samo Liu，2025a；2025b；2025c）：人类创造了机器人及其心智；宇宙创造了人类及其心智。运用亚里士多德通过已知推断未知的逻辑体系，结合当今能量科学与信息科学的知识体系，我们能够运用现代认知来解析“心智”的本质。

根据现代物理学、信息论和系统科学的理论，心灵与灵魂可被归类为信息。控制论创始人诺伯特·维纳曾断言“信息既非物质也非能量”，因此它属于非物质存在的范畴。（Samo Liu,2024b）

从亚里士多德的视角来看，这种存在可以被视作第一因或原动力——一种神圣的或形而上的存在，无法用亚里士多德时代已有的知识来解释。（Samo Liu,2025d）

在道家宇宙论中，这种存在对应着阴性；在佛教宇宙论中它代表了存在的因或因缘（Samo Liu,2025i）

融合道家与佛家的宇宙观思想，还存在一个互补的范畴—阳的存在与因素。阴阳相生相克、因果循环的关系，遵循着自然界的相互依存法则，以及五行动态生成与制约的规律。其终极目标在于平衡与中道—即“无为而为”与“五蕴皆空”—这些构成了宇宙本原的自然平衡。

现代物理学揭示，阳的存在和因果要素表现为物质存在，其起源在于一种非物质能量的形式：粒子与夸克、暗物质与暗能量。这些阳实体的终极来源是绝对零度、光和绝对空间。（Samo Liu,2025i）

根据这个推理，我们可以将普遍存在分为三个层次：

物质存在—分子、原子和细胞，包括人类、动物和植物的细胞，以及星系和天体。（Samo Liu,2025d）

物质的本原：非物质的能量—粒子、夸克，可能还有暗物质和暗能量。

能量的本原—存在于绝对零度、光和绝对空间中；物理学还告诉我们：“能量”来源于“物质”的运动和变化。

所有这些“阳”存在都处于绝对运动和转化的状态中，物理学研究它们的相对运动和变。（Samo Liu,2025i）

科学发现的所有“物理力”本质上都是描述物质存在相对运动和转化的理论。（Samo Liu，2025d）所有存在皆在五行阴阳循 环转化中运行，受信息存在（即我们所说的意识与灵魂）的影响。超越物质的一切被称为非物质存在，这些非物质存在既是物质存在的本原，也是其本体和归宿。（Samo Liu,2024i）

分析基础

哲学基础：佛教宇宙观思想《金刚经.心经》；道家宇宙 观经典包括《道德经》《文子》《庄子》《列子》；王阳明心学；莱布尼茨单子论；牛顿物质运动理论。

科学基础:现代物理学、当代科学、系统科学和矿物加工科学。

哲学方法论:辩证唯物主义和亚里士多德的《形而上学》。

II. 研究与讨论

2.1 亚里士多德的《形而上学》

亚里士多德的《形而上学》和《物理学》一样,都是致力于探索宇宙本原的作品。虽然《物理学》研究的是"存在"本身的变 化以及存在之间的运动关系,但《形而上学》则专注于运动和变化背后的"第一因"和"第一原理"—即存在之所以运动和变化的根 本原因。

这个研究涉及的主要问题包括:
宇宙的本原是什么?
物质的本原是什么?
人类的本原是什么?灵魂存在吗?
什么是自由意 志和因果关系?

这部不朽的论著是在亚里士多德死后200多年由他的思想继承者罗德岛的安德罗尼克编纂的,他将亚里士多德关于本质、灵魂、意志和自由的著作整理成一个集子,放在物理学之后—因此有了"形而上学"("物理学之后")的标题,暗示了顺序和超越物理学。

形而上学运用物质哲学推理来研究非物质问题,尽管在亚里士多德的时代,可用的知识和信息不足以定义或验证"非物质"存 在的概念和性质。

传统上,形而上学被认为是哲学的早期分支,它在缺乏经验或科学验证的情况下,对世界的本质和宇宙进行思辨和理性的 反思。换句话说,它代表了人类对未知的哲学探索—一种根植于本体论的、宇宙本原的哲学。

哲学家们通常认为形而上学是亚里士多德的"第一哲学"。不,形而上学,或宇宙本原哲学,使用物质哲学—第一哲学—作为一种方法:利用已知来探索未知。第二哲学是物质科学,它通过科学的逻辑来研究认识论和方法论,并付诸工程技术实践。

亚里士多德用物质哲学研究自然、宇宙和人类社会,为自然科学和社会科学的分类奠定了基础,他的著作中深深扎根着科 学哲学的实验方法和逻辑方法。

纵观历史,无论是康德质疑形而上学的可能性,尼采宣称其不可能,黑格尔通过辩证法重构了形而上学以创造辩证法,海 德格尔将其从静态转变为动态存在,还是维特根斯坦和维也纳学派因缺乏经验验证而拒绝形而上学—没有谁能掩盖亚里士多德 形而上学哲学的智慧光辉。

人类思想的历史是随着时间的推移而展开的,当科学知识和信息还不充分的时候,对形而上学的每一种批判都只是一种过 早的判断。有些人甚至指责亚里士多德是一个非理性的唯心主义者,但他的著作中并没有这样的证据。他不是一个神秘主义者,而是一个严谨的逻辑思考者。

由于所处时代的知识局限,亚里士多德运用物质哲学推动人类思想发展,而未对时空本原展开系统性探究。古希腊哲学中 缺乏系统的时空理论框架,使他将这些未知领域交由神学与神秘主义来阐释。然而,他对物质哲学和自然科学的运用,却为人 类智慧与科学进步开启了崭新篇章。

中国标题"形而上学"(Xíng ér shàng xué)首次由日本学者井上哲次郎翻译,源自《易经》:"形而上者谓之道,形而下者 谓之器。"中国学者严复更倾向于使用"玄学"(Xuanxue)这一术语,该词源自《道德经》中的一句话:"玄之又玄,众妙之门。"

今天，“形而上学”是更常用的术语。

现代物理学与历次工业革命的演进，将人类认知从物质科学转向了能量科学与信息科学领域。这一转变印证了古代宇宙观的核心洞见—“空”与“无”所象征的存在本质，正是非物质性的动态变化与二元对立。基于这种全新认知，我们应当重新审视并诠释亚里士多德的《形而上学》

释亚里士多德的《形而上学》。

《形而上学》中文版的结构

《形而上学》的中文译本共包含十四卷。很多版本，这里引用其中一本（亚里士多德，2016）

第一卷：概述古希腊哲学（十章，第1-33页）。

第一章讨论了人类对知识的本能、技术（工艺/技能）的演变，并得出结论认为技术超越了经验。它还断言，知识和信息的

增长必须由哲学智慧来引导（第1-4页）。

第二章通过哲学家超凡的智慧与学识，将他们与普通人区分开来。作者强调，哲学智慧超越了实用知识，尽管看似无用，

却是最高尚的知识形式（第4-6页）。亚里士多德对哲学推崇备至，引用西莫尼德斯的名言：“唯有神明才有解释自然的特权。”

古希腊哲学融合了科学、哲学与宗教，而亚里士多德是首位将其分门别类的学者。他还指出，诸神被视为万物的本原与本体。

如今，物理学家已揭开自然神圣性的奥秘，从而继承了这份神圣特权。（Samo Liu, 2024g; 2024h; 2024i）

第三章深入剖析了古希腊哲学四大成因—质料因、形式因、动力因与目的因，并对前人理论进行批判性分析。具体案例包

括泰勒斯的水本原说、阿那克西美尼的气本原说、赫拉克利特的火本原说、恩培多克勒的四元素学说（水、气、火、土），以 及巴门尼德的存在论体系和阿那克萨戈拉的努斯（灵）理论（第7-10页）。

第四章系统梳理了赫西俄德、巴门尼德、恩培多克勒、留基伯和德谟克利特等先贤的宇宙论体系，以及原子论思想。与道家“无为而为”和佛教“五蕴皆空”不同，亚里士多德运用物质哲学与道德推理对这些理论进行批判性评估。他首创了非矛盾性（不矛盾定律）、存在与虚无、肯定与否定等概念—这些思想与东方宇宙观中的阴阳二元对立原理遥相呼应（第11-13页）。

由于第一因是一个非物质属性，仅凭物质哲学无法充分解释它—正如牛顿不能通过物质哲学来解释绝对空间一样。这并不是亚里士多德或牛顿的缺陷；即使在今天，如果没有相对论和量子理论，我们也无法有意义地讨论能量和信息作为非物质的存在。

第五章深入探讨毕达哥拉斯学派提出的“万物皆数”理论，将数字视为形式因与质料因的双重存在。该章节重点解析巴门尼德关于“一”与“多”的哲学思想—这位古希腊哲学家主张“一”具有无限性与神圣属性。值得注意的是，零的概念在当时尚未形成。巴门尼德提出：存在者之外，无不存在者存在，存在的事物必然是一；非存在者则不存在（第13-17页）。今天的信息论可以解释为0和1的存在。

从宇宙本原哲学的角度解读，“存在”作为名词表达存在本身；作为动词或形容词时，则暗示空间形态与时间进程—因此，存在即生命，宇宙即生命。(Samo Liu,2024a)

第六章重点探讨了柏拉图、赫拉克利特和毕达哥拉斯的综合哲学思想(第17-20页）。其中多个观点与东方宇宙观不谋而合：它断言，所有可感知的事物都在不断变化，因此，它们永远无法被定义，因为它们总是在变化。

它还提出，与物质有关的数源于大小的比较；与原因有关的数对应于“一”——“大和小对一的参与”产生数。
由于当时零的概念尚未被认知，我认为对大与小的关系应当理解为参与零而非一；所有对存在的理解都必须建立在以零为原点的坐标系之上。(Samo Liu,2025h)

亚里士多德还将毕达哥拉斯的“元一作为本体”的概念与东方的无极概念类似。他进一步提出了宇宙的二元本原说，类似于东方的太极观念。然而，他没有结合无极和太极—实际上，太极是无极的生命基础。最后，他批评了通过诸如善与恶这样的道德范畴来分析宇宙本原的做法，因为这些是人类意识的主观构建。宇宙本身没有道德意识—只有“无为而为”和“一切法空”的自然法则。(Samo Liu,2024i)

第七章对古希腊哲学家的宇宙论理论进行了总结与评价，得出结论认为这些理论都未能充分解释四因问题(第20-21页)。 相比之下，道家和佛家的宇宙观则系统地整合了这些原理。(Samo Liu,2025c)

第八章对每位哲学家进行逐个批判，指出他们只讨论实体存在而忽视非实体存在—尽管后者确实存在。亚里士多德所说的“ 非实体存在”，正是我定义的“非物质存在”。

虽然他没有使用这个术语，但通过逻辑推理，他推导并确认了这些本体作为动力因 和本体基础的存在。

第九章继续讨论宇宙论思想(第25-33页），介绍了意式、通式、第三人、本体和参与等术语，并研究了它们与数字的关系 和矛盾。

这些概念与东方的“无极”“太极”、因果条件和阴阳等观念密切相关。然而，古希腊哲学缺乏系统性，这些思想常以零散且相互矛盾的方式表达。亚里士多德运用物质逻辑来批判这些不一致之处。

本章还探讨了元素与数字之间的关系—尤其是1和2之间的关系—探讨了大与小、长与短、多与少的问题。然而，他的分析不如道家或佛家宇宙观那么全面。(Samo Liu, 2024i; 2025c)

在我的逻辑框架中，我采用零基坐标系来分析“因素”的存在与转化。(Samo Liu, 2024g; 2024h; 2025h)

第十章的结论是，哲学的最终目标是研究四因；所有希腊人对宇宙本原和支配存在和转化的原则的解释都遵循这一框架。

第二卷：哲学与学术研究纲要(共三章，第*34-39*页）

第一章(第34-36页）认为，由于人类的智慧是有限的，真理不是那么容易掌握的；然而，随着知识的积累，每个人都在对 真理的理解上有所贡献。

第二章(第36-38页）指出，四因理论是哲学分析的基石。任何对宇宙和存在的分析都必须确立第一原理—因果链与类型不可能无限延伸；凡在形式和时间进程中具有开端的事物，必然也有终结，且必须同时存在动力因与目的因。

第三章(第38-39页）讨论了学术研究方法和学科的组织。

第三卷：哲学主题(共六章，第40-61页）

第一章指出，哲学探究源于怀疑，**而困惑与**辩证检验**能化解迷思。**亚**里士多德列**举了十三个研究主**题：这**些源自物**质**哲学反思的科学哲学**问题。**第七个主**题**主**张**超越物**质层**面研究因果关系—建立在存在本身**

之上的因果关系；第十三个主题则探讨“数”与“点、线、面”是否具有本体论地位。若具备本体论地位，它们是与可感事物混合存在还是独立存在？（第40-42页）这一问题至今未有定论，催生了“四维时空”“高维空间”和“时间反演”等概念，并在现代物理学中引发某些理论矛盾。(Samo Liu, 2025a; 2025b; 2025c)

第二章(1)(第43-48页）探讨了事物究竟是完全具备四因理论还是仅部分符合，以及是否存在一门能整合这四个要素的学科。认为唯有哲学才能完成这项研究。亚里士多德的物质哲学将物质科学与第一原理宇宙学的研究相协调，为物理学以及哲学和神学领域长达两千多年的蓬勃发展奠定了基础。然而由于当时知识的不完整性，无法对宇宙本原进行全面研究。如今借助

相对论和量子力学，我们已具备足够的知识来整体探究宇宙本原与本体论；在此类研究中可参考道家与佛教的宇宙观以及辩证 唯物主义。(Samo Liu, 2024g; 2024h; 2024i)

作为一门研究宇宙本体论的学科，哲学如何认知第一原理？(第43页）亚里士多德认为，每个事物都内在蕴含终极原因，推动其生成、存在与变化。对于永恒不变的本原或“不变的”而言，变化概念显然不适用—显然，古希腊哲学并不承认非物质性、无极(无限)或阴阳转化的存在，因此将宇宙本原或本体论视为“永恒不变”。这或许可以解释为何后来被称作“形而上学”的学科 与辩证法之间存在着对立关系。

若宇宙本原是“永恒不变”的，那么物质世界从何而来？从亚里士多德的著作来看，他的本意并非如此，后世读者也误解了他　的观点。在《形而上学》第四卷第八章(第88-90页），他明确批判了那些片面的人为判断—诸如“万物皆静止”或“万物皆在变化”。他认为宇宙本原是一种永恒不变的存在，虽自身不动，却能引发一切运动与变化—这堪称极具前瞻性的观点。然而他并未阐　明，这个“不变”的无极本身是充满活力的阴阳动态平衡—这种涉及宇宙平衡的领域，正是古希腊哲学所缺乏的理论资源。

两千多年的科学哲学发展带来了：物理学探讨宇宙本原的动力因；量子力学和相对论探讨质料因；热力学探讨终极因；电磁学探讨阴阳结构因。(Samo Liu, 2024i)

关于存在形式的根本原因，学术界尚未达成共识，这与空间概念密切相关。人类为何具有人的形态？动物为何具备动物的形态？石头为何拥有特定的结构和形状？粒子与暗物质又呈现何种形态？由于存在形式各不相同，需要专门学科来研究形式因。然而任何学科都无法脱离哲学指引—例如，若用物质哲学而非宇宙本原哲学来探究宇宙本原，必然自相矛盾。宇宙本原哲学应当采用能量与信息视角，这种非物质化的思维方式借鉴了东方宇宙观和辩证唯物主义。

第二章(2) (3) (4)探讨了研究宇宙本体论的学科是否也应当研究所有学科共有的基本法则；哲学能否研究宇宙本体论与本原的所有方面；是否存在专门研究事物属性的独立学科；以及若哲学不局限于本体论范畴，是否应当整合事物的主要属性。正是这些思考促使亚里士多德开创了自然科学与社会科学的分类体系，并确立了哲学作为学术探究核心与灵魂的地位。

第二章(5)提出的问题是：是否存在一种不可知的宇宙本体论，是否存在“间体”或研究这类中间实体的学科。现代物理学 和科学用存在之间的关系和因果条件的力学来回答他的问题。

第三章(6)　(7)提出疑问：若第一原理属于学术领域，其地位应居于最高还是最低？答案是：最高。亚里士多德的物质　哲学方法为研究宇宙中的物质科学开辟了道路，促成了该学科的蓬勃发展。然而，当时缺乏系统研究宇宙本原的科学依据；希　腊学派关于宇宙本原的零散且不系统的理论无法满足他的逻辑分析需求。如今现代物理学已具备研究宇宙本原的知识与信息，但第一原理仍是这一领域的最高学科。(Samo Liu,2024i;2025a)

第四章(8)　(9)(10)(11)以清晰的逻辑处理了几个问题，但结果并不明确。例如：认知依赖于具有共同和普遍属性的事物，而不能摆脱具体事物；然而，第一原理应该属于一个类别还是属于数字1？文本对此并不明确。它们应该属于0：宇宙本原的研究应该从零开始。(Samo liu, 2025h)

第五章(12)讨论了“数”“点”“线”“面”“立方体”是不是“本体”？如果不是，那是什么让我们对于事物的“本体”如此迷惑？变化、运动、关系、趋向、比例都不能够揭示任何事物的“本体”，因为他们都不是事物存在的本身。推论是“本体”的属性不应该称之为实际存在。

第六章(13)做出一个伟大的推断：元素(因素)，在实际存在之前，可能是“潜在的”“某种状态存在”－尚未成型的非物质，现代物理学证明了这个推断。

第六章(14)强调研究“本体”的重要性，就是研究“存在”的“这个原理”，不应该仅仅满足“存在”的“这般样子”。

第四卷：论哲学的范围(八章)

第一章(第62页）认为，要把握存在本身，就必须寻求第一原因－存在之为存在。

第二章(第63-68页）指出，研究宇宙本原必须从物质的基本原理和成因入手。亚里士多德通过物质哲学开启了物质科学的 研究，并推动了宇宙学与神学的发展。他认为物质存在与“元一”密不可分，在考察对成、元一与众多时，最终得出所有事物皆源于对立的结论—这种对立可归结为“是与非”“元一”与“众多”。

这可以理解为阴阳、无极与太极的对应关系。尽管亚里士多德未研究东方宇宙观，但本章思想脉络与周敦颐《太极图说》存在共鸣。(Samo Liu, 2025c)

第三章(第68-70页）认为，哲学研究的是适用于各个学科的共同规则和公理。在这些首要原则中，最确定的是阴阳之间的 矛盾/互补原则—这是宇宙活动的基本原则。

第四章和第五章(第70-84页）探讨了矛盾律。亚里士多德认为无需证明；试图证明会导致悖论。他使用“是”与“非”的术语，提出了阴阳矛盾的命题，并提供了多个论证来证明该定律的不可否认性：否定它就等于抹去万物之间的所有差异。这让人联想到朱熹的理学。

在哲学领域，这个概念通常被译为“不矛盾律”；然而，我认为它应该被称作“矛盾法则”。亚里士多德用非常直白的语言表达了这一观点：所谓“矛盾”，其实是一个由人类创造出来的概念。人类本身就生活在矛盾之中，我们通过语言、词语和数字来描述这些矛盾、识别它们，并试图解决它们。矛盾有时会引发争论，甚至导致诡辩；但如果过分纠结于这些矛盾，或者无法解决它们，就可能会使人陷入抑郁，或者引发冲突。

宇宙没有“矛盾”，“是”就是“是”“不是”就是“不是”，“存在”就是“存在”“不存在”就是“不存在”，取决于宇宙的“本原”“本体”。人类只能研究之，即使人类可以创造新的“存在”，只能符合之。

或许亚里士多德没有研究过东方哲学，但是其思想总是和东方的宇宙本原思想契合。

第五章进一步论证，否定或质疑矛盾律会动摇人们对感官知觉真实性的信心。作者还批评古希腊现象学家将宇宙的总体真 理从局部现象中推论化。与此同时，他肯定宇宙中确实存在“永恒不变的存在”。通过东方宇宙观解读，这种“永恒不变的存在”是 非物质存在—原始非物质存在：绝对零度、绝对空间与光。这是阴阳平衡的状态，可理解为“永恒不变”，实则是阴阳相生的“无 极”。(Samo Liu,2025g)

第六章(第84-86页）研究事物之间的关系，并认为这种关系是无穷无尽的；因此并非一切都能被证明。这类似于道家的阴 阳和佛家的因缘而生。第七章讨论排中律，这里它类似于道家的平衡和佛教的中道，但仅凭物质哲学推理并不能得出关于宇宙本原的结论。

第八章论证了“万物运动”和“万物静止”构成了一个哲学矛盾。从本章的分析来看，后来哲学中“形而上学”与辩证法对立的倾 向似乎是一种误判。

总体而言，东方哲学通过系统却难以捉摸的直接感知逻辑来阐释宇宙本原；若缺乏科学成就，便难以获得认可。与之形成 对比的是，亚里士多德运用已知推断未知，采用易于理解的逻辑来诠释希腊较为松散的宇宙体系。他通过物质哲学为自然科学 开辟道路，并将物质哲学推理应用于宇宙本原研究。尽管其时

代缺乏完整知识体系来全面阐述宇宙本原，但他仍为物质科学与　神学奠定了基础—这种影响被证明是深远的。第五卷：形而上学的核心（30章）这一卷证实了形而上学是一种宇宙本原的哲学。它运用第一哲学（物质哲学）的逻辑原则来研究和分析宇宙的非物质本原 —因和因素—以及它们相关的范畴。

第五卷：形而上学的核心（30章）

这一卷证实了形而上学是一种宇宙本原的哲学。它运用第一哲学（物质哲学）的逻辑原则来研究和分析宇宙的非物质本原 —因和因素—以及它们相关的范畴

第一章考察了“原”（本原，原始）的六个含义。受此启发，我设计了空间、时间的0基点“本原坐标。”(samo liu,2025h)第二章讨论了四种因：形式因、物质因、动力因和目的因以及“因”的命题。我认为现代物理学给出了初步答案（samoliu, 2024g；2024h；2024i），这四种“因”把原始“因”“因素”都当作“因”，这就是东方哲学的“阴-阳”以及“因－因素”。

第三章讨论了“因素”（元素、要素）的六种解释和含义。这六种含义和解释分别是：基本组成；本原之物；基本要素；不可　再分之物；“点”；“科属”和“界限”。亚里士多德没有按照东方哲学“阴-阳”进行分析，他没有分清楚本原和本体的“因”“因素”。

第四章提出了关于自然（自然禀赋和属性）的六个论点。认为，“本性”乃是自然万物的动变渊源。用东方宇宙本原思想分析，体现了宇宙中“存在”的“本体”之间的关系。
第五章分析了对必需（必然）的四种解释。这四种解释是：“条件”“强迫”“别无他途”“实证和结论”，体现了宇宙“本原”“本体”的方向性。

第六章研究了“元一”（yuan-yi）的论题，甲乙丙...1、2、3...用很多物质的话题讨论“1”，简单理解，类似于讨论东方的无极（无限），用我的术语来说，是零原点。可描述为大于零的存在被称为“多”。

第七章探讨“存在”（being）的本质，从四个方面探讨了“绝对存在”和“属性存在”。根据现有认知，我们可以明确：“绝对存在”包含物质与非物质存在的共存与转化，而“属性存在”则是人类感知到的存在与表达—即道家的道与德。（Samo Liu,2024i; Liu Hongjun & Samo Liu,2021d）

第八章探讨了“本体”的概念，并对早期的论述进行了批判，尽管并未完全阐明“本体”的定义却说清楚了一件事：人类发明了语言文字数字和数学就是为了研究物质和人类到底来自哪里。我认为本体即是本原本身；量子力学和相对论、热力学如今为我们提供了关于宇宙本原及本体的相关知识。（Samo Liu,2024g）

第9-10章“相同/不同”“对立/相反”研究存在的矛盾和变化。研究表明：“存在”只有相对地存在和变化，没有“相反”。只有“方向 性”可以表示“相反”。但是，“存在”和“方向性”“品种有别”。

第十一章“前”与“后”探讨了存在过程的相对性。显然，古希腊哲学缺乏对时间本原的系统性探究；这类研究在佛教和道教哲　学中得以体现。（Samo Liu,2025c）然而，这里提到两个关键逻辑：“原动者”的“动变”由自己开始是绝对的；“本体”具有“先于”的 “潜在性”。

第十二章探讨了现实性与潜能性与动力因的关系，分析了能、能者、无能与力能等概念。尽管亚里士多德在《物理学》中 已论证了存在的可感知性（亚里士多德，2019；Samo Liu，2025i），但本章未对此展开深入论述，却说明了一个逻辑：“能－潜能”的正当定义就是事物动变之源。东方宇宙观认为，存在的感知正是宇宙动力因的根本根源。

第十三章研究“量”与“量元”，认为是事物“属性”“本性”的计量，把空间、时间也当作“量元”。

第十四章研究“质”与“素质”，认为质的主要意义在于本体的差异，次要的意义在于质的变化和运动/变化中的质的转化。

第十五章探讨的关系，研究了“数”“潜能”对于“存在”的逻辑关系，类似于道家的阴阳和五行，以及佛家的因缘。现代物理学表明：非物质粒子和夸克之间的关系导致原子的产生；原子之间的关系导致分子和物

质的产生;物质的变化和运动又导致能量的产生;能量和信息的关系让人类重新认识物质和人类;依然是形而上学。

第16-30章探讨了一系列人类创造的知识类型术语的原始状态—“完全”“限”“由彼”“由己”“安排”“持有过程”“禀赋”“阙失”“持有，存在于”“从”“部分”“全/共/总”“剪裁”“科属”“假”“偶然/属性”等—从而开创了对知识本身本原的研究。

第28章专门研究了“科属(种族)”，提出了事物的哲学范畴“与属有别”。

第六卷:现实与存在的分类学研究(四章)

第一章提出，每个学科都应研究其存在的合理领域与现实本质。物理学、数学和哲学属于理论学科;哲学应当引领所有学科的反思进程，其目标应当是研究独立存在且永恒不变的宇宙本原。亚里士多德通过物质哲学的反思，界定了物质科学的学科范畴，同时强调哲学既是这些科学的灵魂所在，又是它们的先锋，更是探究宇宙本原的基础。

作为理论学科，数学与物理学可作为神学(研究不动原理)的工具。若神圣存在于世间，必存在于这些事物之中。因此，哲学是首要学科(基础学术研究)，而非(仅）第一哲学。第一哲学是“以已知推演未知”的逻辑方法，我称之为物质哲学。物质哲学既是物质科学的灵魂，也是探究宇宙本原之智慧所在。

从这一章可以清楚地看出，亚里士多德区分了第一学科，第一哲学和第二哲学。第一学科是研究宇宙本原的哲学—即形而上学的主题。因此，形而上学是第一学科而不只是第一哲学。(注:这一点在现代物理学中非常重要。)

特别强调:无论研究哪一门类事物“怎是”，均应以事物的“本体”为起点;“灵魂”是自然现象，探索自然现象的“怎是”，灵魂不能脱离“物质”和“存在”。

第二章对四种实际存在的实体进行分类，论证偶然存在不能构成一种特殊的艺术，并且论述了偶然、常然和必然之间的关系。论证了“潜在之是”与“实现之是”的逻辑是，遵从自然。

第三章进一步追溯了偶然事件的原因，以类似于道家阴阳五行中的生与克的方式，利用A、B、C之间的关系，得出任何追溯最终都必须咨询四因:物质因、目的因、动力因和形式因。

本章第一句就说了让人思考的话，没有生灭过程而生灭的原理与原因是“应该”有的。到底有没有呢？

第四章探讨了真伪命题，指出所谓的“真”其实是人类对现实的认知—这种认知可能与客观事实并不完全吻合。我认为这实际上是在讨论自然存在的真实性和科学的不确定性:人类创造的知识和信息属于人类的理解范畴，并不必然反映自然界的实际状态，而人类的探索永无止境。

第七卷:论本体与宇宙本原的方法(十七章;形而上学的核心)

第一章提出的问题是:宇宙的本原或本体是什么？它是如何存在的？它的质量和数量是如何变化的？这些问题构成了人类通过知识和信息进行分析和判断的基础。

宇宙的本原或本体可称为第一原始:在定义、认知顺序和时间维度上都具有原始性。亚里士多德时代尚未形成零的概念;在我的著作中，我将其定义为0—即起点—从绝对零度、光速与光的起源本原，以及认知的零点开始。零既是物质本体，也是宇宙的本原，更是笛卡尔坐标系的原点。

第二章列举了希腊诸流派对本体的不同观点，提出了宇宙本体的若干论点。显然，希腊诸种不同的实体学说缺乏道家、佛教宇宙观中所具有的系统性和逻辑性。

第三章运用四个概念—怎是(quiddity)、普遍性、科属以及底层—并以“物质”“形式”和“复合个体”作为研究本体的基质。

作者主张，若必须选择，应当以形式而非物质作为本体；以形式作为本体最具吸引力—同时也最令人困惑。在我的著作中我主张：在物质宇宙中，物质与非物质都是宇宙的本体。“无名天地之始；有名万物之母（不翻译）。”量子力学和相对论表明，宇宙的科学本体是非物质的信息与能量。(Samo Liu, 2024g; 2024h; 2024i)

第四章研究了“怎是”与本体之间的关系，即人类提出的定义与自然本原之间的关系。人类的定义—怎是—是我们试图在知识匮乏的情况下，探寻宇宙的宏大本质和真理；它仍然处于一种“未知”或“认知不足”的状态。

第五章分析了主题和属性的复合，得出结论说我们不能确定本体的“是什么”，也不能严格地定义它—本体之外的范畴不能独 立地定义它，因为本体就是自然本身。知识可以研究它，但只能通过不断接近它来研究。

第六章问一个事物和它的“怎是”是否相同；它们不同。人类的理解是知识和信息的积累；“怎是”属于自然本身和人类不断地 探索—一个永恒的存在和反思的过程

古希腊（和其他国家的）哲学家经常认为他们自己的“理解”是正确的，而其他人的是错误的—这种倾向源于人类反思的天赋，也是一种人类的“毛病”。

正确性应该由科学的概率运作来判断：高概率的主张可能是正确的；低概率的主张可能不是。热力学、相对论和量子力学 证实了道家和佛家的宇宙学：阴阳无极，阴阳太极，五行生克，依缘而生，中道与平衡—以及希腊的“元一”和“流变”的概念。

第七章研究起源模式：宇宙的自然创造力和无意识生成，没有刻意的序列；以及人工制造，包括人类的意图和制造—我称 之为人类主观意识：人造存在。(Liu Hongjun & Samo Liu,2020;2021a)

古希腊哲学并没有表现出一个系统的道家通过无为而为的学说，也没有佛教关于五蕴皆空的学说—即“空”和“无”的存在感。

然而，亚里士多德也认为，在人类创造之前存在着物质存在；人类的创造运用了物质，而物质的被创造状态可以通过“阙失” 来描述。什么是阙失？希腊思想缺乏系统的阐述；东方哲学对此进行了探讨，现代物理学也发现了与之相关的知识和信息。

第八章或许是《形而上学》中最为引人入胜的一章，充分展现了亚里士多德运用已知来分析未知的物质哲学逻辑。他认为，创造必然有一个起点、一个先在的原因和一个结果效应。

他论证说，形式并非首先独立存在；形式的创造效力是赋予个体存在的，或者说依赖于个体存在的。我认为形式是空间中存在的表现；形式因在空间中的创造原则尚未得到充分阐释—现代科学表明，阙失是能量与信息之间的一种矛盾关系。(Samo Liu, 2024)

第九章考察了三种模式：人工制造、自发生成和宇宙本原或本体的自然生成。

第十章阐释了部分与整体的界定，并在存在过程中提出了“先”与“后”的时间性问题。在人类生命中，“灵魂”与“肉体”是同时统一的；否则就会死亡。他没有说明所有存在都是阴阳共存的、有意识（感知而非感觉）和活的—这是古希腊思想的一个空白。

第十一章探讨了“类别”与“部分”在复合实体中的形态关系，指出人类灵魂是原始本体，而身体则是物质—即综合实体。第十二章继续以人类为视角研究本体本质，强调由于属、种、形式的层级差异导致本体无法被准确定义。第十三章通过底层与“怎是”的复合体来考察实体，既将本体视为个体又将其视为本体，并再次得出结论：本体不存在严格定义。

第14-15章对“诸意式”（various eide）是本体的荒谬学说进行了批评。

第十六章研究本体的潜在物，并讨论“元一”、实是、原理、要素、原因和本体之间的关系。它介绍了对坏灭性存在（物质）和不坏灭存在（非物质）作为本体模式的探讨。

第十七章从全新视角重新诠释了本体本质。其核心观点是：本体或宇宙本原即自然。然而宇宙赋予人类与生俱来的追问本能—“怎是？”，即探究事物存在的根本原因。我们探究的关键在于要素（因素，元素）与原因（因果、动力、终极）。其中最关键的是终极原因：动因。形式因可能是把握宇宙空间的原始动因；动力因与终极因则是使存在要素转化为物质本体的驱动力。

这便是宇宙本原的哲学体系，爱因斯坦相对论仅仅是牛顿力学的物质运动相对论，热力学、电磁力学、强力和弱力也是各存在本体的相对论的依据。（samo Liu, 2025i）

现代物理学发现了物质和能量的本体、动力、目的，模糊了其形式和过程。（samo Liu, 2024g）

第八卷：论物质与形式（六章）

在六个章节中，亚里士多德将物质哲学应用于宇宙本原的研究，强调原因（阴）、原理（因果条件的关系；阴阳和五行）和本体要素（因素/元素；阳）是探究宇宙本原的真正对象。

第一章认为，事物的“物质底层”也是本体，呼应了《道德经》中“有名万物之母（不翻译）”的观点。它暗示原子本体即能量，原子可以诞生分子、细胞等。可以理解为“本体”就是“存在”的基本结构，其相互的相互关系及变化的方向性产生物质和“存在”。

第二章指出，尽管本体是“实际存在”，但它本质上是一种潜在实体，而“实际化的实体”则是与空间相关的形式因。这揭示了空间形式因的根本首要性，并分析了事物形式与其综合个体的定义：正是空间形式和结构使“怎是”转化为“这个”。时至今日，我们仍未完全理解形式因，相对论与量子力学各自坚持着自己的“空间哲学”，如果物理学忘记了“学术灵魂”必然产生矛盾。（SamoLiu,2025f;2025b）

这一章揭示了“物质”作为三维度的形式蕴含着“能量”“信息”，“阴阳二元”“三相一体”导致“存在”本身及相互之间的相互关系和变化方向。

第三章认为，通过分析形式和综合实体，我们仍然不能完全澄清诸本体、灭坏性、灭坏过程和不灭坏；“数”或数学也不能解
决这些问题。

第四章区分了“远因”和“近因”，认为每一种自然物质都有其自身的近因和动因；他以人类睡眠为例说明这一点。第五章探讨物质的变迁。

第六章则剖析“一”与“多”这个深奥的矛盾，最终得出所有“非物质起源”皆可称为“元一”的结论。在我的著作中，我将这种非物质存在称为“无极”；它亦可诠释为能量与信息、绝对零度、绝对空间和光；东方哲学则称之为“无极”与“太极”。

学习这一章可以理解为：虽然亚里士多德没有应用东方哲学的宇宙本原原理，他的研究结论和东方哲学有异曲同工之妙。

第九卷：论潜在性与现实性（共十章）

第一章探讨了潜在之能与实际之能的本质差异，核心在于理解潜能的主动与被动动变。在我看来，现代物理学已破解这一难题。物质哲学引领着物质科学的发展方向，使人类认识到原始存在的本体是力学—即“信息”“物质”和“能量”之间的阴阳转化。（Samo Liu,2025f）

力学，是“存在”之间（或自身结构）相互作用（吸引－排斥）的关系，这种关系体现的是“存在”具有感知。第二章探讨理知潜能与非理知潜能。唯有人类拥有植根于主观意识的理知潜能，人类具有“灵魂”，兼具

感知与感觉的双重功　能。然而所有存在类别及其本原同样具备感知能力，这属于“无为而为”与“五蕴皆空”—即非理知潜能的范畴。(Samo Liu,2025i)

亚里士多德将人类之外的存在视为“无灵魂”，将其与“宇宙本原”区分开来—这一立场植根于物质哲学。实际上，他在《物理 学》第三卷第三节中已经推理出了“存在”具有感知，他自己都不敢相信这一逻辑推断的意义。(samo liu,2025i)

东方哲学与古希腊哲学在此展现出本质区别。东方宇宙观认为，人类及万物的“存在”都承载着感知的“心灵”与“灵魂”;唯有　人类和动物(细胞生物)具备感觉能力、明确的心灵与灵魂，而人类独有逻辑推理能力，以及与生俱来的语言、文字和数字天赋。人类应当心怀感恩，向宇宙中的神圣存在致谢。

人类的存在是宇宙中罕见的“低概率”事件—这是人类奋斗的结果—我们也应该感谢自己。
第三章分析了希腊人对“能”“不能”和“潜能”的概念。以人类感觉为例，它认为“能”和“不能”只是人类感觉和知识的问题，而潜 能属于宇宙自然—通过无为而为、五蕴皆空实现“隐藏之成就(隐德来希)”行动的。

第四章断言，凡是可能的都会存在—也就是我们今天所说的“高概率事件”。

第五章探讨了潜能如何被获取，以及存在如何实现。文中讨论的一个关键条件是意志或欲望。此处仅涉及人类的意志或欲望;东方宇宙观认为，宇宙中和空间中的所有存在都具有感知性的“意志”。这才是宇宙本质的真实潜能，比如力学。(SamoLiu,2025i)

本章还考虑了潜能是非理性的;它可能属于生物或“非生物”。亚里士多德没有进一步探究—显示出希腊哲学的一个空白。

第六章研究了“实现”的性质，认为必须解决关于运动/变化可能性的命题才能研究存在的“实现”，并认为诸如“无限”和“虚空”之类的活动永远不可能是“实现”的进程。

显然，用物质哲学的逻辑来推断运动/变化和潜能的“虚空”与“无限”，而不是用东方宇宙论的系统知识，是无法得出东方的无极与太极概念的。亚里士多德逻辑哲学的伟大之处就在这里，它不涉及对错的问题。在这一点上，我们可以清楚地看到他的思想指出了三条哲学路线，将哲学分为:神学路线;物质哲学/逻辑路线;(第一哲学)以及物质科学中不同学科的科学哲学/物质科学路线(第二哲学)。

第七章运用物质哲学逻辑来探讨事物何时具有潜能、何时不具备，最终得出结论:事物并非在每个时刻都具备潜能。他没　有意识到，自己创立的物理学揭示了“宇宙自然”始终处于动态的、相互感知的转化过程中—也就是说，它始终具有潜在性

可以理解为:他研究“潜在”的成功概率，有的成功有的不成功。

他进一步认为，在一个潜在的事物中，“思想”的功效使它成为一个完全实现的存在;而由内在本能产生的事物，在没有外部阻碍的情况下，可能就是它们所能成为的一切。

他还分析了“土”“气”和“火”之间的关系，但忽略了东方的“金、木、水、火、土”及其非物质属性，以及相生相克的五行关系—这些关系恰好与现代物理学中的力学关系相吻合。(Samo Liu,2024i,2025f)

第八章声称，潜能先于定义和公式，因为潜能属于自然，而定义和公式是人类的构造。

他还指出，所谓“存在过程”(时间)的前后概念实为人类诡辩。他清醒认识到“时间概念”是人类强加于自然界的定义，却未充分阐明这一观点—这种希腊学界对“存在过程”研究的缺失，已成为现代物理学领域的一大遗憾。(Samo Liu,2025c)

即便如此，他仍然认为哲学对宇宙本体的探究应该为先，从这种意义上“实现”先于潜能。他认为人类的官能活动是通过行动实现的，知能活动是通过产品实现的。

他进一步区分了一种永恒不灭的存在方式与一种可灭坏事物;可灭坏的包含着相互矛盾的对立因素,因而无法持久。但什么是“永恒不灭”呢?希腊人把天体视为“永恒”的,然而这些天体也会变化。

用物质哲学逻辑研究宇宙本原自然会导向一种“神学哲学”。

本章以一个前景结束:学术意式上将有更高的学术,动变意式上将有更高的动变;实现显然先于可能性和所有运动/变化的 原理。

第九章和第十章继续讨论“是”与“非”“善”与“恶”“真”与“假”。人类对自然的判断总是与自然本身有一定距离。

2.2.形而上学的结论:宇宙本原哲学中的“存在”

第十卷:研究了“元一”“对反”和“间体”(10章)

这些章节继续分析古希腊宇宙本原或本体的概念。

在希腊哲学中,宇宙本原的概念包括理性的知识和感性的(感知的)知识。

在东方宇宙论中,不同的学派同样将感知和理性知识结合起来,所有这些都以《易经》为基础体系,《道德经》系统化了 这些见解(Liu Hongjun & Samo Liu, 2021d)。

佛教宇宙观还形成了基于“空与有”“因与因素”和缘起性空的辩证法的学派;《金刚经》与《心经》系统化了这一知识体系(Liu Hongjun & Samo Liu, 2024)。随后该体系与道家思想相融合(Liu Hongjun & Samo Liu, 2020),最终形成了完整的 宇宙本原哲学体系。

亚里士多德试图用物质哲学的逻辑,辩证地评价和总结希腊思想。其结果是发展了神学、第一哲学和第二哲学;科学哲学 迅速发展,然而现代物理学中某些紧张关系也因此而产生。

如果没有热力学、量子力学和相对论的知识,那么对宇宙本原的哲学进行评判就没有充分的依据。能量科学和信息科学提 供了新的知识和信息,要求重新思考“空间和时间”以及其中的“存在”。

这值得学术界的关注。 人类历史由人类创造;宇宙的历史则是人类通过语言、文字和数字构想并塑造的。由于当时没有数字“0”,人类在语言、文 字和数字上的表达是不完整的;像亚里士多德这样的思想家是引导人类反思所必需的(Samo Liu, 2025h)。

今天,数学不仅有“0”,还有以0为原点的笛卡尔坐标系,以及牛顿和莱布尼茨的微积分—构建了人类的数学大厦,使我们 能够在宇宙本原和本体的框架内,将对宇宙本原的知识与现代物理学结合起来。

第一章至第二章探讨了“元一”,即宇宙本原哲学中的无极概念。亚里士多德从“物质存在”与“非物质存在”的视角出发,运用 物质哲学的逻辑框架,却未能系统地推导出东方哲学中关于无极、太极、阴阳五行、平衡、因和因素、缘起以及中道等核心思 想。

在没有数字零的年代,东方和西方哲学都曾把“宇宙本原”称为“一”。因此,“空”和“无”的宇宙学思想无法清晰地表达出来(Samo Liu, 2025h)。

第三章探讨了“一与多”的哲学命题。从宇宙本原的哲学角度来解读,他本质上是在探究“零数”和“非零数字”的存在与尺度。

这一议题让人联想到《金刚经》第十一章:佛陀与须菩提长老曾就“单个恒河里的沙子是“多”,还是很多恒河里的沙子是“多”展开讨论。

在这里产生了“单与众”“对反”“诸对反”“相对”“综合实体”“同”和“异”等概念,特别提出“属相同”“属有别”“种相同”和“种有别”。

在我关于“0”的自然和形式的文章中，我提出了宇宙存在的五个阴阳域哲学范畴（Samo Liu，2025h）：

阴阳无极—绝对零度，绝对空间，光：一种“绝对无限”“活着的”存在，没有大小度量或时间过程－具体地说，不是没有，而是人类的知识无法定义之，只能叫作“无限”。其余四类属于阴阳太极：暗物质/暗能量—知识尚不充分，尚不清楚是否与粒子与夸克同属同一类。二者皆非物质实体，无法用三维度量或常规时间　尺度来衡量。量子力学提出了普朗克时间与普朗克尺度的概念，而M理论则构建了“点、弦、膜”的哲学框架。我认为这些概念应 从宇宙本原的非物质视角进行诠释。

物质—人类最主要的科学知识体系，其中包括那些位于我们本星系以及星系团。然而我们仍然不知道空间的真实范围，有　多少星系，有多少恒星存在，更不用说原子和分子的数量了。于是无限大和无限小就产生了。

人类发明了坐标系、微积分和指数表达式。如果我们的知识足够，物质存在—无论大小—都可以表达；在人类大脑无法计 算的地方，我们已经造出了计算机。我们并不害怕计算或表达；我们缺少的是知识。
目前的科学认知仍主要属于第四类：物质。“用已知研究未知”的物质哲学逻辑仍是人类的伟大成就。热力学、相对论和量子 力学已经阐明了“物质”的两个极端：

物质的本体性起源于非物质的能量，又归于能量，不论其动能是否达到光速，它都以能量的形式存在，在运动中又消解为 能量。

有了这些已知的东西，我们可以补充第4-10章关于“元一”“对成”和“间体”如下：
物质存在：第四阴阳域哲学范畴，是人类生活和知识的领域，原子、分子和细胞。

形式存在：由三维坐标和微积分描述；最小尺度以普朗克尺度为零点；最大尺度以光年或秒差距为单位；实际单位包括米、分米、厘米、毫米。

动力因：事物对力的感知—质量对引力；电磁特性对电磁力；微观结构对强弱力；存在对热力学平衡。
目的因：中道；平衡；公平；对称。

形式因：我们现在对原子结构有了清晰的认识；在细胞结构和信息方面取得了进步；我们可以对原子、分子、植物细胞、 动物细胞和人类细胞进行分类；然而，对所有生物的“形式”（空间）的因果知识仍然是不完整的（Liu Hongjun & Samo Liu，2020；2021a）。

存在过程的表达方式：年、月、日、时、分、秒—这是太阳系中地球的时间体系，由我们的祖先创造，主要适用于“我们”。
如果其他系统存在“他者”，他们未必（事实上几乎肯定不会）用这种方式描述时间。时间是人类构建的非物质知识体系。

物质存在 II：第五个阴阳域－哲学范畴，宇宙恒星和星系的领域。

形式存在：三维坐标；最小尺度：光年/秒差距；最大尺度：“无限”，这表明我们的知识是有限的，也许我们无法知道在“无边无际”的空间中有多少星系。动力因：同第四类范畴。

形式因：对太阳系的清晰理解；对银河系的部分了解；对星系、星团和超星系团的范围；对恒星、卫星、白矮星、中子星和黑洞的认识—但宇宙知识仍然远不如我们对地球生物的了解。
存在的过程：可以用“kalpa”来表示，大约是43.2亿年—同样是一个人造的知识。
非物质的存在性：第三个阴阳域哲学范畴，量子力学的领域，粒子。

形式存在：非物质、非三维；可以用零原点坐标系表示；通过M理论的“点－弦－膜”理论进行思考；最大尺度：普朗克尺度；最小尺度：“0”，待暗物质和暗能量被明确后将进一步确定。

量子力学已经对粒子、夸克进行了分类。

动力因:对作用力的非物质感知;将电磁属性归因于电磁力;将结构属性归因于强/弱力;将存在归因于热力学平衡。目的因:如第四类。

形式原因:不清楚;然而,我们可以肯定"非物质",并借用M理论的"点、弦、膜"。

存在过程:普朗克时间—又是一个人为的知识。

非物质存在Ⅱ:第二个阴阳域哲学范畴,暗物质和暗能量的领域。
此处的知识尚不明确;用物质哲学结合宇宙本原哲学逻辑做出的推论。
非物质存在Ⅲ:第一个阴阳域哲学范畴,绝对空间,绝对零度和光的领域。

这一范畴的结论是将道家、佛家和古希腊宇宙论与现代物理学和辩证唯物主义相结合。它标志着人类对宇宙知识和信息的终极追求,是人类存在的必要探究领域—也是形而上学未完成的事业。
以上结论告慰亚里士多德:如果物理学有"哲学相对论"的话,当属《形而上学》。

2.3 关于宇宙本原的形而上学归纳

第十一卷:对物理学和形而上学的书进行了简要的总结。(十二章)

第一章问哪些学科,或者什么样的学科,可以被称为智慧。

人类是智慧物质(Liu Hongjun &Samo Liu, 2020);所有的知识和信息都是人类智慧的表现。语言、文字、数字、数学、坐标系和科学都是表达这种智慧的工具。

在亚里士多德之前,"哲学"可以涵盖多种知识体系,他将其划分为不同的学科。如今,哲学、数学、物理学等学科都为研究宇宙本原做出了贡献。热力学、相对论和量子力学不仅揭示了物质(原子)的本原与本体,还为"物质与人类皆源于'空'与'无'"这一命题提供了科学依据。这标志着哲学从物质哲学向能量哲学的转变,这种思想归功于亚里士多德。

哲学反思仍然引领着所有学科,但它依赖于它们的研究和探索—无论是社会科学还是自然科学。

人类通过创造计算机和机器人,赋予机器以"灵魂"与"心灵",由此实现了从物质哲学向信息哲学的跨越。借助这种方式,我们得以探究宇宙与人类的心灵本质。尽管我们仍无法确认"那究竟是什么",但先辈留下的宇宙本原学说,结合亚里士多德用已知 推演未知的逻辑体系以及辩证唯物主义,与现代物理学相结合,将催生出一种新型哲学(Samo Liu, 2025f)——这种哲学需要 多学科的共同参与验证。

第二章讨论了"实是存在"(物质)与"元一"(非物质)之间的本体论关系和原则,介绍了点和"1"作为本体论的概念,以及综合实体(由物质和形式组成的事物)的概念。

物质哲学无法表达这样的结论:每个存在—不仅仅是人类—都具备感知能力,并且在时间进程中持续"存在"直至其终结,尽 管亚里士多德在物理学中已经推导出所有"存在"都具有"感知能力"。(Aristotle, 2019; Samo Liu, 2025i)

第三章探讨了学科如何被赋予特定研究领域—这构成了物质科学的分类逻辑—并指出哲学的核心主题在于学科的共同"诸是"及其基本"对成"关系。第四章主张物理学与数学实为哲学的分支学科。第五章深入剖析人类认知中"既是又不是"的悖论,并为矛 盾律提供理论支撑。

第六章批判了违反矛盾律的希腊学说;第七章将哲学视为对神学的探究,是其他科学的先驱;第八章区分了自然本质与后 天形成;第九章讨论了潜能与运动的实现,认为变化是潜能趋向现实的过程。
第十章论证了"无限"无法在物质宇宙中实现,并证明有形物体仅在距离、运动和时间方面具有相对性—这可以称为"无限"。

因此,在我对宇宙本原的分析中,将"存在"分为五类,每一类都从0开始,以某个数字为终点。

“无限”标志着人类知识领域的“无能”;热力学、相对论和量子力学允许“存在”通过极限来表达，克服了人类智慧的这种无能。

宇宙本原的本体—无极或元一是绝对空间、绝对零度和光，即宇宙的原始天尊。它无法用人类的时间进程或形式的度量来表达;它是阴阳在因和因素中的无限平衡，是产生宇宙的物质“第一因”“本体”。

第十一章分析了变化的模式—运动和变化，提出了三种类型:生成与坏灭;完全生成与完全坏灭;部分生成与部分坏灭;运动是变化的一个范畴。

第十二章论证指出，在本体与关系的范畴中，无论是运动是“主动”还是“被动”的范畴，都不具备“动中之动”或“变中之变”;运　动仅属于质、量、位的范畴。四个论证表明不存在“动中之动”或“变中之变”—这一洞见与庄子的“有长而无乎本剽（不翻译）”不　谋而合。然而在阐述“空间”“时间”“无极”与“太极”时，该论述的系统性和清晰度不及文子、列子或庄子(Samo Liu, 2025c)。

他认为“本体没有运动和变化”这个论点后来被误解了;他的意思是，本体的“静止”在希腊的理解中标志着一种阙失。

第十二卷:研究总因和第一推动者(十章)。

第一章指出，主题是本体，调查涉及其原理和因。

如果宇宙是一个整体(一个完整的实体)，那么本体是它的主要部分;其次是质和量，它们仅仅是本体的禀赋和变化的方 式。

他将本体划分为三类:两类可感知的本体—永恒的与易逝的—以及不可感知的不动本体。通过物质哲学对希腊本体论的分　析，揭示了人类知识在探究本原与本体时的局限性。因此，我借鉴现代科学成果，综合提炼出五个本体论阴阳哲学范畴(SamoLiu, 2025h)，还有五个宇宙本原“本体”系统“种-属”。

第二章使用物质哲学逻辑来推导物质作为第三种东西，并在原因和原则中断言三个项目:定义或形式;相应的对定义/形式 的阙失—两者形成一对相关联的项目;第三，物质。 由此可以很容易地得出结论:信息和能量构成物质。

在这里，他增加一种变化模式—本体变化—总共四种类型。

第三章总结了三种实体—物质、自然本体和综合个体—以及四种创生模式:通过技术、自然、偶然和自发。
第四章最终得出结论:原则/原因的类别可分为四类(形式、缺失、质料、动力因)或三类(形式与动力因的结合)，且动　力因可分为近因和远因，其中远因是事物的普遍原因。动力因又可分为内在与外在两类:自然产物源于外因，而思维产物则不 然。

第五章从逻辑上论证了万物的实体和因与人类的灵魂和身体相似。他提出了一个概念—拥有全部四种原因，咸依实体，并 源于一个原始总因的“非普通人”概念可作通解，从而为人格化神灵奠定了哲学基础。

第六章首先推导出一种“永恒、不动”的不变的本体，并将第一因确定为所有导致实现存在的原因的总因;因此，他建立了“ 自然之神”的哲学基础。

什么是这个“第一原因”或“总因”？即使在今天，有了绝对空间的知识和绝对零度的光，我们也不能说清楚。我们只知道，在 所有存在中，只有人类拥有主观意识，并创造了一套语言、文字和数字的知识体系—这是为了我们的生存和存在而设计的。

第七章引用星球作为“永恒的原动者”的证据，通过理性引发变化，并赞扬自然之神的“善”—纯粹的思想(非物质)，独立于 可感知的世界;这样的本体必须是不变的。

这一章用极其优美的语言解释并赞美了神—“人格化”宇宙之神。

第八章认为，希腊哲学和神话都承认永恒自然本体的神性；宇宙是单一的，原动力是独尊。

第九章讨论了心灵、理性、思想、人类的心灵和神圣的心灵，以及思考与其对象的同一性。

第十章将“善”理解为自然之神的性情，它凌驾于万物之上并提供秩序。宇宙之神创造了人类和所有生灵；如果仅仅称其为“ 善”还不足够。
第十三卷：研究数学对象和意式（十章）。

第一章概述了希腊数论和意式论之间的分歧，并区分了两种感性的实体：数学对象和形式。

第二章（1）提出了七条论点，以表明数学对象不能构成一个独立的本体，无论在可感知事物之内还是之外。

第六个论点认为：三维的主体可以是实际存在的（物质），但抽象的点和线不能是实际存在的（非物质）。因此，M理论中 的点、弦和膜的概念应该属于非物质的哲学领域（Samo Liu，2025h）。同理，三维以上的数学研究是允许的，但是，把这种学　术应用在物理学是一场哲学闹剧，违反了哲学原理。这在另一篇文章讨论。

第三章认为，数学对象不能独立存在于现实中，尽管在思维中它们可以被当作可分离的。他指出光学、声学和数学之间的关系—数字和线条是光和声音的特殊禀赋，力学也应该被研究—从而开启了一条非物质的数学探索之路。

第四章（2）批判了希腊诸意式的学说，并总结了它们的来源；第五章继续批判，包括对柏拉图的批判。
第六章（3）对把数字当作实体来对待的做法提出了总结性的批评和讨论；亚里士多德揭示了希腊哲学的一个重大缺陷。然 而，由于他通过物质哲学来探究宇宙的本原，他自己也陷入了这一“重大缺陷”之中。

这个“缺陷”是：数字和数学是人类至关重要的信息工具—我们研究和理解宇宙本原及其本体的最精确的工具。没有数字，人　类的语言、文字、数字工具包将是不完整的；没有几何学、坐标系和微积分，现代科学进步将不复存在。

然而，数和数学虽然产生于自然，但它们是人类认识自然的创造物；它们本身并不是自然。把“数”当作“宇宙本原”或“本体”，这是古希腊哲学的致命缺陷，也是它与东方宇宙本原的关键区别。

东方的宇宙论认为本原和本体是“空”和“无”的存在，也称本体为“一”，但它不纠缠于数字—因为当时没有数字“0”，东方等待着零的到来。“零”是人类一项重大的创造和发现。（Samo Liu,2025h）
“零”是宇宙本原的“总因”和“原因”。宇宙中所有“存在”的本体都始于它自己的零；只有“总因”和“原因”是无限的，称为绝对的 “0”。

第7-9章继续批判柏拉图和其他希腊人，他们把“数”作为本原，困惑于这个单位对质量和数量的差异，并提出了“未实现的无限”以及如果它是有限的，“它的极限在哪里”的深刻问题。

这里出现了一个伟大而迷人的哲学问题：“点”是什么？一个点是如何被创造出来的？谁能回答这个问题？
第十章讨论第一原则是个别性还是普遍性，认为：潜能不能与现实分离，普遍不能与个别分离。
学习这一卷可以模糊地感觉到一个问题：“存在”和“是”都是阴阳合一、有生命的。

第十四卷：亚里士多德继续对希腊意式论和数论的批判（六章）

第一章论证了诸对反不能作为第一原理，因此，宇宙中的存在与变化属于因和因素缘起与阴阳的一合体。物质与人类都乃　如此；它们并非“存在”与“反存在”“因素”与“反因素”，也不是“物质”与“反物质”的范畴或属性。

说明一个问题：宇宙的存在是绝对的，其中也必然存在被人类描述的“绝对”的东西；然而，物质性的存在，只有变化的“相 对性”。

第二章认为，永恒的实体不能通过“元素”来表达，而只能用潜能来描述为一类“非是”（非物质）的存在。这里有个结论被现代物理学所打破，他说：“非是”永不会被证明为“实是”。原因是古希腊没有“元一”“无极”的“阴阳”理论，没 有能量和信息的区分。也就是说《形而上学》表达的那个“神”必定是有生命的。

这里提出问题：潜在的本体并不由本身而成为实是，诸本体不是一而是多，其中“那个关系”令人困惑。第三章继续驳斥了数字作为独立实体的理论，重申点、线、面不能是独立的物质实体。这启发我们思考，“点、弦和膜”可能 代表非物质的存在形式。

第四章批判了“善”是第一原则这一荒谬的观点。第五章进一步谴责了“数”是事物的要素或因的说法，而第六章则彻底否定了数作为宇宙本原的观点。

至此，《形而上学》中文版至此告一段落。然而亚里士多德关于宇宙本原的物质哲学探究并未终止—这一研究延续至今（Samo Liu, 2025a），让我们继续深入思考他的学术遗产（Samo Liu, 2025b；2025c；2024i）。

2.4.归纳

形而上学代表了亚里士多德对古希腊宇宙本原哲学的系统总结和批判，但它未包括东方的知识。然而，他的哲学逻辑却隐 含着东方的知识。

因此，亚里士多德对宇宙本原的研究是不完整的，尽管他的物质哲学的逻辑框架是完美的，等待着后来知识的丰富。在物理学中，他推导出存在之间的相互感知（亚里士多德，2016；Samo Liu，2025i）；

在《形而上学》中，他推导出“存在”作为一个具有准人类特征的复合体的概念，并证明将“数”作为“本体”是不合适的，“点、弦和膜”属于非物质领域-其时空逻辑判断-这些结论与东方宇宙本原哲学惊人地一致。本文并非要强调东西方宇宙观的差异，而是认为《易经》、古印度神话、古波斯神话以及古希腊神话哲学都存在着深刻的 共性。或许人类祖先都曾经历过相似的时代——那个通过感知认知理解世界并创造知识的阶段，我们可以称之为“理性感知”。（Liu Hongjun & Samo Liu, 2021c; Samo Liu, 2025e）

2.5.结论

对宇宙本原的研究是对物质存在和非物质存在的研究—两者都属于人类逻辑分析的领域，因此也属于人造存在的哲学知识。

它本身就是一个非物质文化系统：人类为了生存和存在而创造的信息工具，是人类头脑、灵魂和大脑的共同产物。

因此，提请学术界对心灵和灵魂的存在进行集体研究—人类和宇宙中所有存在的心灵和灵魂。

III. 结语

让我们赞美形而上学的神学深度，致敬亚里士多德，并纪念过去五个世纪的伟大科学家，他们将人类的思想提升到神学和 宇宙的境界。（Samo Liu, 2025e,2024g）

形而上学造就了现代科学和物理学，是现代知识的“本体”，现代科学印证了形而上学的逻辑推断。

研究声明 本研究从工程师的角度，用道家哲学、佛家哲学、古希腊宇宙本原哲学结合辩证唯物主义反思物理学。作者主张参与这一 讨论的权利，希望通过这为解决现代物理学中的矛盾提供一个新的视角。

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On the Origin and Transfer of Dust Aerosols in the Direction of Volzhsky

Гаспарян Артур Сергеевич & Азаров Валерий Николаевич

ABSTRACT

This article examines forward and backward aerosol transport trajectories for the city of Volzhsky using the HYSPLIT dispersion model, using the example of August 19, 2022. A brief climatic description of summer 2022 conditions conducive to the formation of natural dust is provided).

Keywords: dust, particles, aerosol, trajectory, HYSPLIT.

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On the Origin and Transfer of Dust Aerosols in the Direction of Volzhsky

О происхождении и переносе пылевых аэрозолей в направлении г. Волжского

Гаспарян Артур Сергеевич[α] & Азаров Валерий Николаевич[σ]

Аннотация

В статье рассмотрены обратные и прямые траектории переноса аэрозолей для г. Волжский с помощью модели рассеивания HYSPLIT на примере 19 августа 2022 г. Дана краткая климатическая характеристика условий лета 2022 г., способствующих образованию природной пыли.

Ключевые слова: пыль, частицы, аэрозоль, траектория, HYSPLIT.

ABSTRACT

This article examines forward and backward aerosol transport trajectories for the city of Volzhsky using the HYSPLIT dispersion model, using the example of August 19, 2022. A brief climatic description of summer 2022 conditions conducive to the formation of natural dust is provided.

Keywords: dust, particles, aerosol, trajectory, HYSPLIT.

Author: Волгоградский государственный технический университет, г. Волгоград,
Волгоградский государственный технический университет, г. Волгоград,

I. Введение

Загрязнение атмосферного воздуха является важнейшей проблемой мирового масштаба. Взвешенные частицы, загрязняющие атмосферу, образуются в результате деятельности человека, а также от природных источников. Загрязнение воздуха природной пылью, особенно от локальных источников, научным сообществом недооценено. К природным частицам относятся: вулканический пепел, почвенная пыль, дым от лесных и степных пожаров, морская соль. Образование почвенной пыли характерно для засушливых регионов. Такая пыль с помощью ветра переносится на расстояние сотен километров. Наиболее распространенной формой почвенной пыли являются пыльные бури. Пыльная буря возникает, когда скорость ветра превышает пороговую скорость трения, при этом образуется облако взвешенных частиц. Облако развивается и перемещается в результате различных процессов, включая адвекцию, диффузию, турбулентность, оседание и даже химические реакции. На пороговую скорость региона влияют несколько параметров, включая текстуру почвы, влажность, растительность, топографию и диаметр частиц [1].

На примере пыльной бури, наблюдавшейся в степной зоне Волгоградской области 19 августа 2022 г. рассмотрим климатические условия, способствующие образованию бури и пути переноса пылевых аэрозолей в направлении г. Волжского. 19 августа 2022 г. температура воздуха составляла +32°, направление ветра восточное со средней скоростью 10 м/с, с порывами до 22 м/с и влажностью воздуха 24%. Средняя температура воздуха за август в Волгоградской области

составила +27,6°, что выше среднемноголетнего значения на +3,8°. Летом наблюдались длительные периоды сухой погоды, которые были связаны с барическими гребнями североатлантических антициклонов, способствующих устойчивой погоде без существенных осадков, с преобладающими северо-восточным и восточным ветрами, временами усиливающимися до 15–18 м/с [2, 3].

Согласно проведенному ранее анализу, преобладающими ветрами для Волгоградской области за четырехлетний период с 2018 по 2021 г. являются ветры северо-восточного и восточного направлений, которые переносят пыль природного происхождения со степной зоны в направлении г. Волжский и г. Волгоград, где смешиваясь с выбросами от промышленных предприятий и автомобильного транспорта способствуют повышению уровня загрязнения атмосферного воздуха [4]. Роза ветров за указанный период показана на рисунке 1.

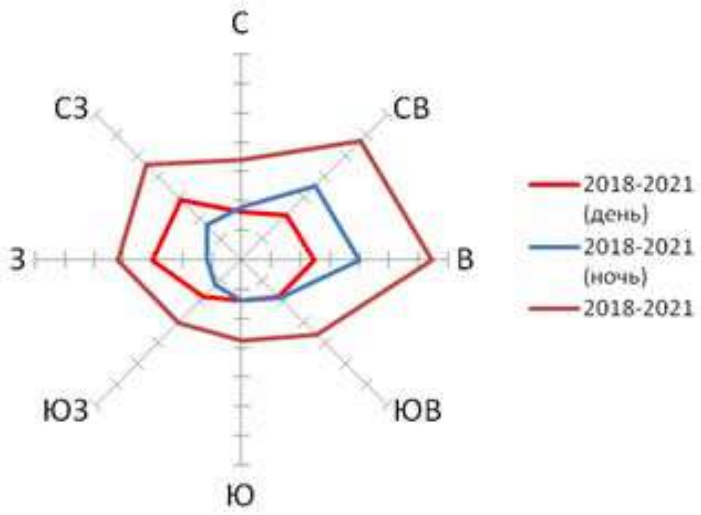

Рисунок 1: Роза ветров степной зоны Волгоградской области за период с 2018 по 2021 г.

Кроме того, был проведен отбор проб пыли в двух точках степной зоны Волгоградской области в августе 2022 г.: в районе оз. Эльтон и в районе п. Заря. При проведении исследования дисперсного состава применялась методика микроскопического анализа с использованием программы «Dust-1» [5]. Результаты дисперсного анализа представлены на рисунке 2, а результаты дисперсного состава пыли представлены в таблице.

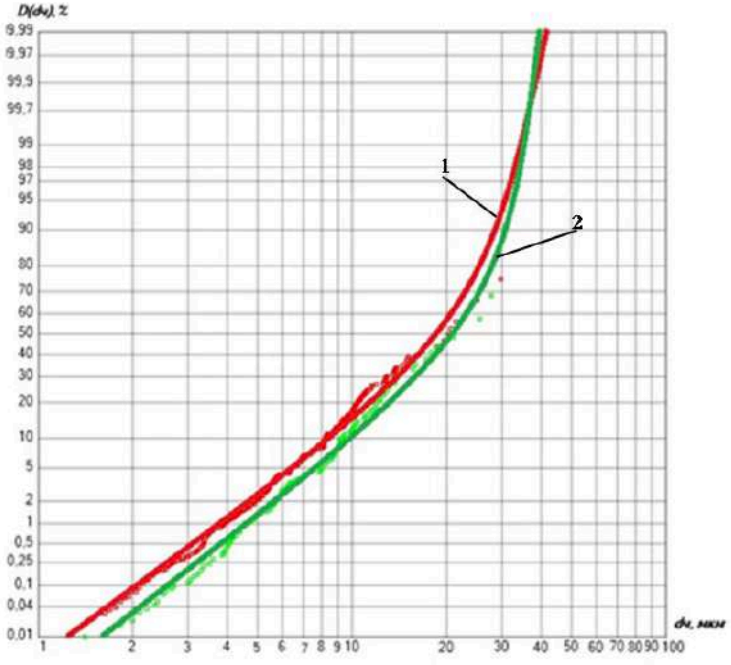

Рисунок 2: Интегральные функции распределения массы частиц пыли

Таблица: Результаты дисперсного состава пыли

№ п/п	Номер точки отбора	Максимальный размер частицы, мкм	Содержание частиц PM2,5 в отобранной пробе, %	Содержание частиц PM10 в отобранной пробе, %	Содержание частиц PM20 в отобранной пробе, %
1	оз. Эльтон	43	0,25	18	58
2	п. Заря	40	0,1	11	48

Дисперсный анализ показал, что в районе Эльтонской степи доля мелкодисперсной природной пыли составляет от 28 до 98 %. Установлено, что чем дальше от степной зоны к Волго-Ахтубинской пойме, тем меньше доля мелкодисперсных частиц в пробе [6].

По данным [7] в г. Волжский 19 августа 2022 максимальные концентрации PM2,5 достигали 42 мкг/м^3, а PM10 450 мкг/м^3 соответственно. Максимальные разовые концентрации PM2,5 - 32 мкг/м^3, PM10 - 250 мкг/м^3. Таким образом, максимальные разовые концентрации PM 2,5 и PM10 не превысили ПДК.

Для анализа происхождения и траектории переноса пылевых аэрозолей применялась гибридная Лагранжева модель рассеивания The Hybrid Single-Particle Lagrangian Integrated Trajectory model (HYSPLIT), разработанная NOAA/ARL. Данная модель используется для моделирования находящегося в воздухе вулканического пепла на основе метеорологических данных, предоставляемых внешними и собственными моделями NWP (численное прогнозирование погоды), которые работают с тремя пространственными измерениями и временем [8].

Модель HYSPLIT включает в себя три типа траекторий: нормальная, матричная и ансамблевая. Также она рассчитывает прямые и обратные траектории воздушных масс на различных высотах для любой точки мира. Например, такую модель использовали для определения происхождения

и эволюции пыльных бурь в Средиземноморье, Северной Африке, Южной Америке, Исландии и Ираке [1, 9, 10, 11].

Онлайн-версия модели HYSPLIT была использована для исследования прямой и обратной траектории распространения аэрозолей для г. Волжский 19 августа 2022 г. Пути распространения аэрозолей прослеживаются через шестичасовой интервал. На рисунках 3 и 4 показана обратная траектория переноса аэрозолей из Свердловской области через республику Казахстан в Волгоградскую область за четверо суток.

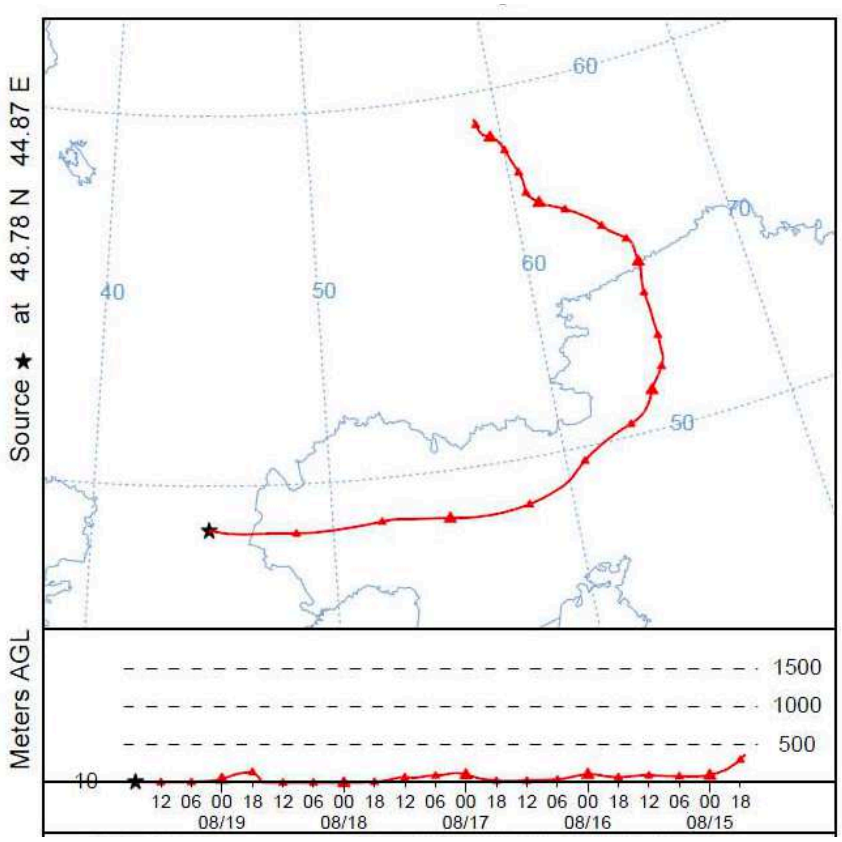

Рисунок 3: Обратная траектория аэрозолей для г. Волжский на высоте 10 м, с датой начала 15 августа 2022 г.

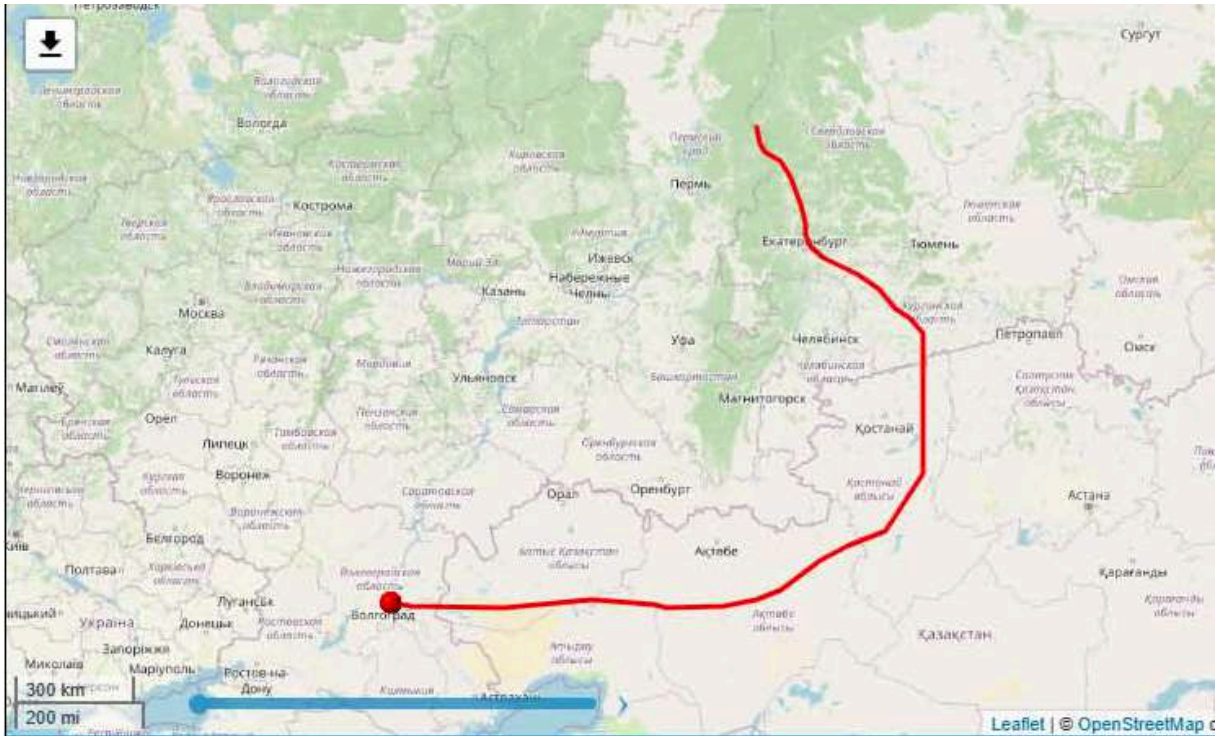

Рисунок 4: Обратная траектория аэрозолей с датой начала 15 августа 2022 г. на карте

На рисунке 5 показан приближенный вид обратной траектории пылевых аэрозолей с датой начала 15 августа 2022 г.

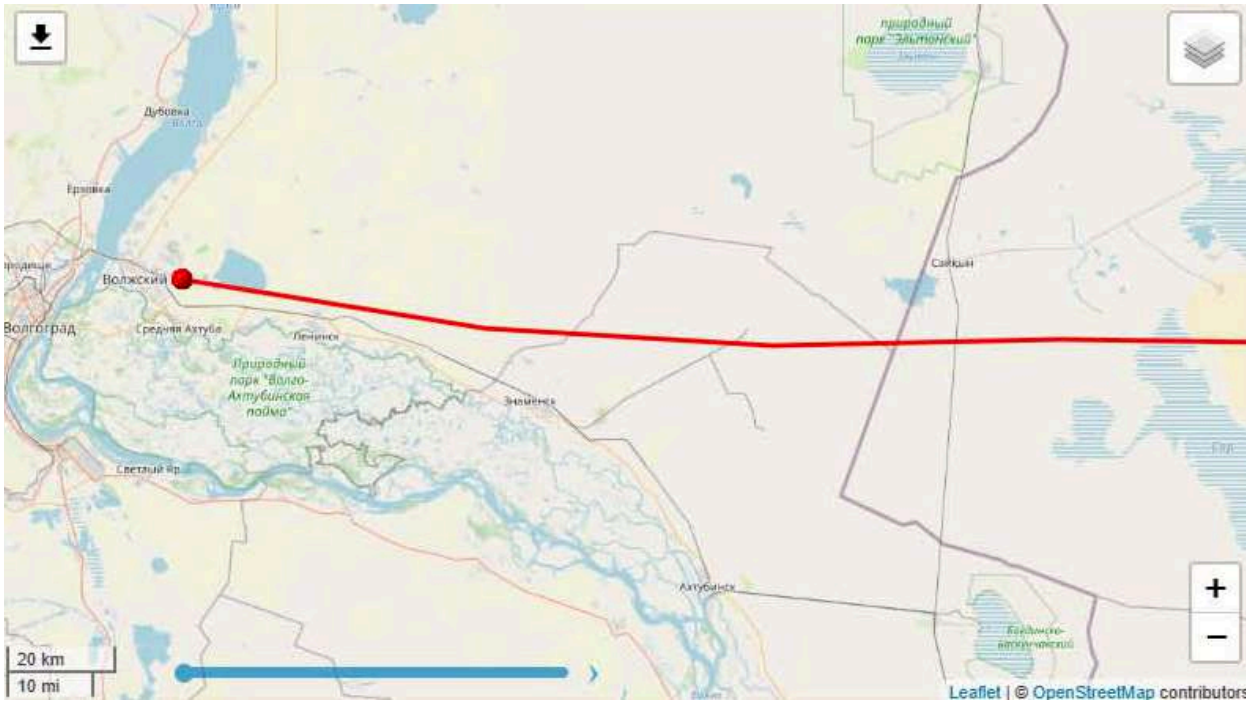

Рисунок 5: Обратная траектория аэрозолей с датой начала 15 августа 2022 г. (приближенный вид)

На рисунке 6 изображен приближенный вид прямой траектории аэрозолей с датой начала 19 августа 2022 г., проходящей через г. Волжский.

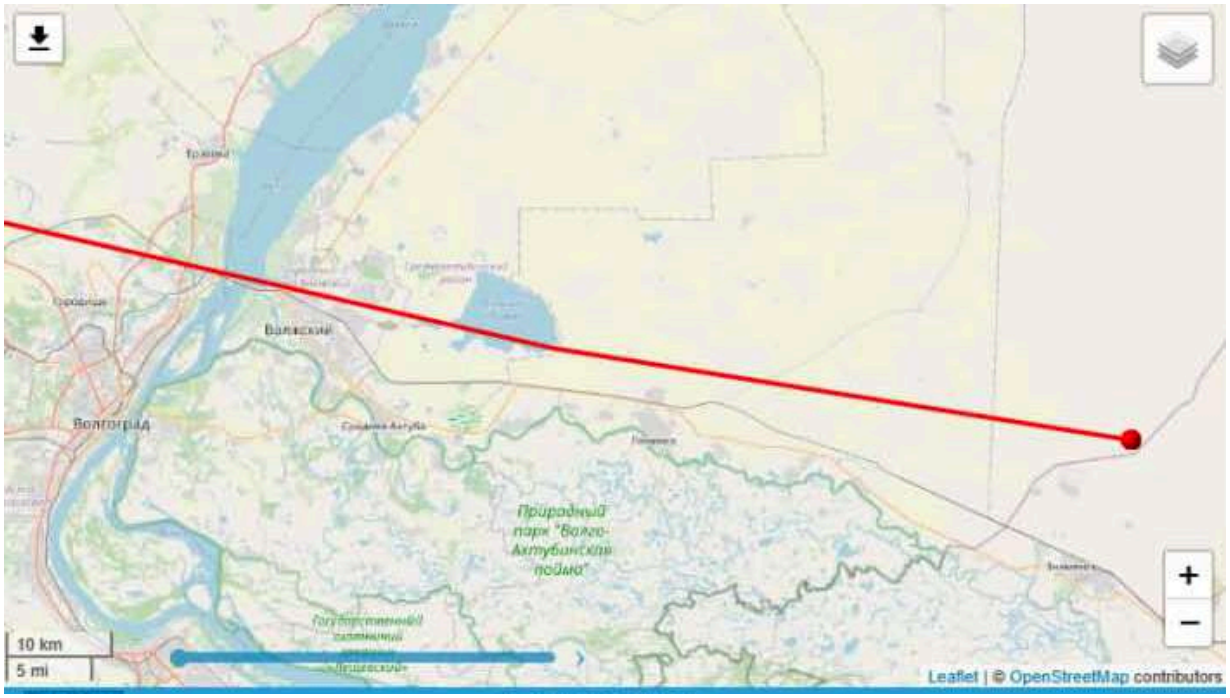

Рисунок 6: Прямая траектория аэрозолей для г. Волжский с датой начала 19 августа 2022 г. (приближенный вид)

В настоящее время в России природная пыль не учитывается при расчете фоновых концентраций. В связи с этим, например, в Волгоградской области для каждого объекта проектирования, строительства и реконструкции, а также при расчете фонового уровня загрязнения на границах санитарно-защитных зон, в жилых районах, при расчете предельно допустимых выбросов, в городах и населенных пунктах с числом жителей менее 250 тысяч, граничащих со степной зоной, при направлении ветра со степи в город, фоновые концентрации необходимо определять при проведении сводных расчетов, а не используя ориентировочные значения, указанные в руководящих документах. Установленные ориентировочные значения фоновых концентраций взвешенных веществ (пыли) не учитывают близость населенных пунктов к засушливым территориям, климатические условия местности, состав почвы, характерные для данного региона.

Данные по фоновым концентрациям показывают, что на территории республики Казахстан, прилегающей к Астраханской и Волгоградской областям, фоновые концентрации взвешенных веществ при ветре северного и восточного направлений превышают фоновые концентрации других направлений в два раза, а PM2,5 и PM10 на 0,06-0,02 мг/м^3 [12]. По информации Волгоградского ЦГМС - филиала ФГБУ «Северо-Кавказское УГМС» фоновые концентрации взвешенных веществ при ветре восточного направления превышают северное и южное направления на 0,1 мг/м^3, а западное на 0,18 мг/м^3 [13].

Метод обратных траекторий позволяет проследить перенос аэрозолей субмикронного размера воздушными массами на значительные расстояния. Он характеризует специфику метеорологической обстановки в течение конкретного периода наблюдения и позволяет оценить степень влияния отдельных регионов на загрязнение воздушной среды исследуемой местности.

Полученные траектории показывают, что путь движения частиц с востока на запад, попадающих в г. Волжский, проходит через степную зону республики Казахстана. В связи с этим

можно сделать вывод, что при климатических условиях августа 2022 г. основным источником пыли для г. Волжский является почвенная пыль, поступившая со степной зоны республики Казахстан и Волгоградской области.

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