

Natural Philosophy and Photon Energy

Daocheng Yuan*

China Academy of Engineering Physics, Mianyang, Sichuan 621000, China

***Corresponding Author:** Daocheng Yuan, China Academy of Engineering Physics, Mianyang, Sichuan 621000, China, Tel.: 18608160633, E-mail: 18608160633@wo.cn

Citation: Daocheng Yuan (2024) Natural Philosophy and Photon Energy, J Energ Res Convers 3(1): 102

Received Date: April 04, 2024 **Accepted Date:** May 04, 2024 **Published Date:** May 08, 2024

Abstract

The understanding of the properties of light and photon energy is an important issue in physics/natural philosophy, and it is also a problem of pursuing cognitive certainty of nature. Comparing the deterministic differences between consciousness and experience, summarizing and analyzing the three causes of thinking, constructing the logical relationship between natural philosophy, philosophical epistemology, and certainty, a four element cognitive model of natural philosophy was established. The model answers the source of certainty of axiomatic knowledge, deepens the understanding of Newton's natural philosophy method of "induction", and also answers the validity of physics and mathematics, as well as their roles and functions in understanding nature. The model clearly reveals the logical relationship between time and space. Based on Newton's methodology of natural philosophy, the logical connection between natural laws and causal thinking and the limitations of falsificationism are expounded, and the traceability of theory (axiom) and three traceability conditions are proposed. A new inductive cognition of "photons as electric magnetic particles" was proposed, and the micro effects and influences of photon kinetic energy are discussed by inductive method. The approach to obtaining infinite clean energy (photon kinetic energy) has been theoretically elaborated.

Keywords: Natural philosophy; Epistemology; Certainty; Induction; Model; Three causes of thinking; Traceability of the theory; Photon Energy

Introduction

The purpose of physics is to explain the natural world around us, perhaps the why or the how of things. Others might say that its role is to understand what came before and to make predictions about what will happen next [1]. In summary, the purpose of physics is to pursue cognitive certainty. Newton declared in *The Opticks* that “*the main business of natural philosophy is to argue from phenomenon without feigning hypotheses, and to deduce causes from effects* (Note: From effects to causes, it is obviously inductive reasoning, as shown in Table 1), *till we come to the very first cause, which is certainly not mechanical.* [2]” Therefore, obtaining a definitive understanding of photon properties and photon energy is the mission of physics/natural philosophy, and a deep understanding of natural philosophy methodology is inevitably a key approach.

Light is the key carrier of available energy on the earth (such as solar energy, fossil energy and nuclear energy, etc.) [3], and it is also the hope of clean energy in the future (nuclear energy releases photon energy). At present, neither particle theory nor wave theory can fully explain optical phenomena, and understanding photon properties and energy depends on wave-particle duality theory. Wave-particle duality theory denies that light is a particle because of interference phenomenon, and at the same time explains the interference phenomenon of particles (electrons), which is self-contradictory and unable to be self-consistent [4]. Electromagnetic theory (32 years before discovery of electrons) is an easy-to-use mathematical method based on macroscopic phenomena, but it is limited to understand electromagnetic phenomena of microscopic particles. The interpretation of photoelectric effect is more like a mathematical understanding, and lacks necessary understanding of the physical mechanism of photoelectric effect, such as photoelectron energy distribution, nonlinear light spectrum characteristics, and the significant influence of polarization and temperature. Photon energy $E=h\nu$ is only a mathematical energy, so it is impossible to determine whether it is kinetic energy or potential energy, and it is impossible to answer how this energy affects mass motion. There are also some important questions, for example, why do photons have such high speeds? Is it the limit? Why is the speed of conduction the same as the speed of light? Where does the energy of electromagnetic waves emitted by electrons come from? Why does photon energy change with wavelength? How to understand the relationship between mass and energy? Answering these theoretical questions and contradictions is of course the business of physics/natural philosophy.

Epistemology involves human cognition and is inevitably related to natural philosophy. Based on this understanding, following the natural philosophy of Aristotle and Newton and the universal experience of cognitive practice, a quaternary cognitive model of natural philosophy (QCMNP) is put forward, Fig. 1.

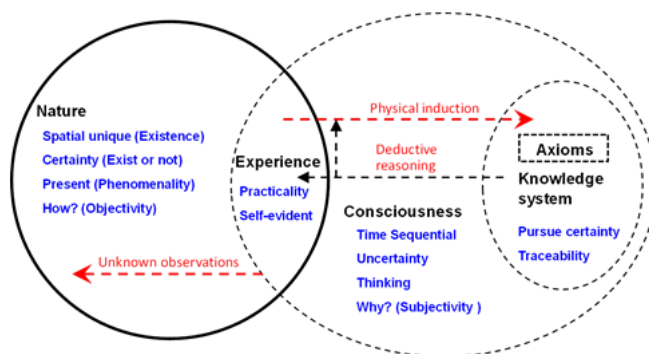


Figure 1: Quaternary cognitive model of natural Philosophy (QCMNP)

Quaternary Cognitive Model of Natural Philosophy

The cognitive objects of epistemological dualism (the duality subjective-objective) in traditional philosophy include objective nature and subjective experience [5]. Epistemological dualism is not strongly related to axiomatic knowledge (science) system, and it does not distinguish the huge essential difference between subjective consciousness and objective experience, which will inevitably

lead to philosophical confusion and vacillation. For example, observing the number of apples on a tree is certain (objective experience) and imagining (creative hypothesis) the number of apples on a tree is uncertain (subjective consciousness). QCMNP innovatively sums up four elements of cognitive objects, namely, nature, consciousness, experience and axioms. Their respective characteristics and logical relations are shown in Fig. 1. Two elements, "consciousness" and "axiomatic knowledge", are added, emphasizing the key characteristics of consciousness — (subjective) uncertainty, and that axiomatic knowledge belongs to the scope of consciousness but has uniqueness — certainty and understandability. Experience (observation) is the practice intersection of nature and consciousness, and the result of consciousness learning from natural practice, so it obtains the inherent certainty of nature and is self-evident. The dotted line means abstraction and extensibility. We abstractly perceive the Earth as an approximate sphere, and we have to ignore its infinite shape details. Therefore, nature is infinitely rich, consciousness is simple and abstract.

QCMNP contains spatio-temporal connections. In the QCMNP, the relationship between time and space is expressed as the relationship between nature and consciousness, which is the logical basis of cognition. A series of conscious memories obtained from empirical observation in any space needs identifiers, which are the concept of time, and the moment of observing phenomena is now. Conscious memory is the premise of all objective externalization of time definition and time observation. Without memory, time cannot be observed. Neither observation rest nor observation motion can affect the passage of time (conscious memory), but time is convenient for observing motion. Time, like conscious memory, has absolute sequence, and this is absolute time. This understanding does not violate Euclidean and Newtonian precepts of absolute space and absolute time. The speed of light is limited, sitting on a high-speed ship or standing in different positions will cause the delay or advance of observation time (conscious memory) — observation time shift. The observation time shift does not change the observed object, nor does it change the observer. The first and later of observing lightning sound from different positions can not change the number, size and life of lightning. "Slow clock", "shrinking ruler" and "grandfather paradox" all originated from absurd "creation hypothesis", which destroyed the traditional view of absolute space and absolute time of mankind for thousands of years.

QCMNP includes three cognitive cycles of thinking (corresponding to three causes of thinking, see Table 1 for details), which are (1) unknown observation thinking, (2) physical induction thinking, (3) deductive reasoning thinking, and the infinite cycle (evolution) of interaction between practice and cognition. People have ideological content and purpose, observing the unknown is the foundation of cognition of nature. Obtaining axiomatic knowledge by experience induction is effects to causes thinking, and deductive reasoning of applying axiomatic knowledge is causes to effects thinking (including the application of experience). QCMNP empirically answers the role and function of three thinking including deductive reasoning (mathematics) in understanding nature.

The pursuit of cognitive certainty is logically consistent and complementary for natural philosophy and epistemology. The QCMNP constructs the logical connection between axiomatic knowledge and cognitive model, and also answers the question of the source of certainty essence of natural science knowledge. The certainty of axiomatic knowledge can only come from the inherent certainty of natural matter. Empirical induction determines the reality of physical axioms, and derives the reality and validity of deductive reasoning (language and mathematics). These new constructions and understandings of QCMNP realize the systematic logical integration of physics, natural philosophy and epistemology.

Natural Philosophical Basis of QCMNP

QCMNP conforms to Newton's natural philosophy. In later editions of the Principia, Rules II and III were reformulated in epistemological rather than ontological terms, which is consistent with the late Newton's endorsement of provisionalism [6]. On inductive methods and axioms, Newton considered the laws of motion as "axioms." *I like your designe of adding something more particularly concerning the manner of vitz by deducing things mathematically from principles derived from Phenomena by Induction. These Principles are the 3 laws of motion. And these Laws in being deduced from Phebackt* [7]. The role of inductive reasoning is to generate knowledge-what [8].

The cognitive starting point of QCMNP is acquired experience. It is Newton's clear view to oppose the creation hypothesis [9].

Newton declared that as proper natural philosophy is based on experience alone, no room was left for the hypothesis of innate ideas [10]. In the mathematical case, Aristotle supposes that there are certain *archai* ("principles" or "starting-points") or "hypotheses" that have to be given in order for any reasoning to begin. Aristotle's thought is that mathematical reasoning does not prove these starting points, but rather proceeds from them in order to prove something else. In the same way, he argues that we should think of practical reasoning as governed by *archai*. All sides agree that practical *archai* are acquired rather than innate [11]. John Dewey said: *Wherein experience presents itself as the method, and the only method, for getting at nature, penetrating its secrets, and wherein nature empirically disclosed (by the use of empirical method in natural science) deepens, enriches and directs the further development of experience* [12].

The connotation of QCMNP accords with cognitive practice. Both physics and cognitive practice pursue certainty, and all cognitive practices involve four elements of QCMNP. The three causes of thinking have stage characteristics (Table 1 for details), and the three thinking cycles of QCMNP have rich cognitive experience basis.

Causal Thinking and the Validity of Mathematics

The study of the logical and philosophical basis of mathematics, including whether the axioms of a given system ensure its completeness and its consistency, is foundations of mathematics. QCMNP is closely related to mathematics, which involves the certainty of inductive reasoning and deductive reasoning, as well as the validity of mathematics and its role in understanding nature. It is beneficial to explore these relations.

Table 1: Three causes of thinking and certainty

Three Causes of Thinking	Three Thinking	Certainty	Applications
Inductive cause of specific phenomenon	Unknown observation	The specific cause may be universal cause, but there are uncertainties	Accumulate and utilize experience
	(specific effects → specific causes)		(Prevent lightning fire, etc.)
Inductive cause of universal phenomenon	Physical induction	Necessary, true and sufficient [14]	Induce universal causes from universal phenomena and get axioms
(The very first cause)[2]	(universal effects → universal causes)	(Laws of Nature)	(Physics, how?)
Deductive cause of axiomatic application	Deductive reasoning (from axioms)	Sufficient	Deductive reasoning from axioms to predict certain specific effect
	(universal causes → specific effects)		(Language and mathematics, why?)
Note: Subjective cause is also thinking cause, but it has nothing to do with cognitive certainty and is not included in the scope of discussion.			

Why eating can't be observed, and how eating can be observed. "Why" (conscious attribute, causal thinking) is a subjective thinking, and "how" (natural attribute) is an objective thinking, Fig. 1. Understanding-how is a particularly deep form of physical understanding [13]. Certainty is the key focus of establishing the connection between thinking cognition and natural attributes. The relationship between causality and certainty is complex. A certain force is the cause of speed change, and it can also be the cause of deformation, which is "the same cause but different effects". Lightning, sunlight and impact can all be the causes of fire, which is "different causes and the same effect". "Same cause but different effects" and "different causes and same effect" are not deterministic

laws. Causal thinking (thinking cause) is an important cognitive method, which is suitable for the needs of human beings to pursue their goals. Aristotle's four causes — formal, material, effective, and final cannot answer questions of certainty, so a new understanding is needed. Experience inductively treats causal thinking method and certainty, thinking cause can be divided into three types, three causes of thinking, namely, inductive cause of specific phenomenon, inductive cause of universal phenomenon and deductive cause of axiomatic application, Table 1. The subjective cause and its complex uncertainty are not discussed.

(1) Inductive cause of specific phenomenon, a simple inductive reasoning from specific effect to specific cause, including many factors and complex causes of natural phenomenon, and causality is complex, fuzzy and uncertain in specific phenomenon. For example, lightning causes forest fires, and the moon looks the biggest and brightest in the night sky, they are insufficient observation and low certainty.

(2) Inductive cause of universal phenomenon, the very first cause, an objective natural law (attribute) and an inductive discovery cause expounded by Newton's natural philosophy. There is sufficient certainty and unique necessity [14]. Its certainty comes from nature. The certainty of cognition can only come from the interaction between consciousness and nature — experience. $1+1=2$, pi, inertial system, law of universal gravitation, and other concepts and symbols with axiomatic attributes are all derived from universal experience induction, which should of course be physical axioms (there are many implicit physical axioms in the knowledge system). The law of nature is hidden in the complex phenomenon of multiple factors [15], and the theory always lags behind the practical experience. For example, it is a common phenomenon that water flows downwards, and gravity is hidden in these complex phenomena. A large number of phenomena observation and sufficient and necessary induction reveal the natural laws behind complex phenomena, which is the inductive cause of universal phenomena revealed by Newton's natural philosophy.

As a philosopher, Hume's naturalism lies in his belief that philosophical justification could only be rooted in regularities of the natural world. Hume's subtle undermining of causality called in question the philosophical basis of Newton's science as a way of looking at the world, inasmuch as this rested on the identification of a few fundamental causal laws that govern the universe. Table 1, the relationship between the three causes of thinking and certainty shows that the inductive cause of specific phenomena is uncertain, in addition, subjective causes have more complex uncertainties. It is reasonable for Hume to weaken cause and effect by naturalism [16], but this cannot be the reason to doubt Newton's natural philosophy. Newton recast his new notion of cause in a traditional language and veiled his innovative notion of causality in Aristotelian terminology [17]. Newton's RULE I. minimizes causes, and adds three important qualifications to causes — necessary, true and sufficient, which are required by gravity and the law of motion [14]. These three restrictive conditions logically eliminate the cause of uncertainty. Newton's fundamental causal laws that govern the universe is the same thing as the laws of nature, and both pursue the certainty of cognition of nature. The connotation of the three restrictive conditions is profound, and the sufficient condition is completely equivalent to Popper's falsificationism, which clearly shows that the rigor of Newton's induction surpasses falsificationism. Popper questioned Newton's induction, but had very little acquaintance with the contents and methodological complexities of Principia [18]. Hume's argument against the rationality of induction does not demonstrate the non-rational nature of Newtonian induction [19].

(3) Deductive cause of axiomatic application, a certain cause, and a deductive reasoning from universal cause to specific effect. It is the application of axioms to deductive reasoning of language and mathematics, and the deductive application of axioms or combinations of axioms is sufficient cause. To demonstrate the strength of bridges, it is necessary to combine axioms of mathematics, mechanics and materials science, and the application of multi-axiom combination is universal. Rivers can be crossed by boat or bridge, and axiom application deduction does not need unique necessity. The diversity of practical methods is logically related to the complexity of natural phenomena.

Obtaining deterministic natural axioms is the task of physics, and the validity of natural axioms determines the validity of mathematics (starting from axioms). The role of mathematics in understanding nature is to apply natural axioms and the certainty of axioms to practice and thinking activities. Mathematical proof is a rigorous deduction, whose task is to obtain the necessary specific propositions from universal propositions, but universal propositions (axioms, postulates, natural laws) cannot be proved. It is

the role of inductive reasoning to generate knowledge-what (universal propositions) [8]. The tasks of physics and mathematics are completely different.

Traceability of Natural Philosophy

Physics/natural philosophy pursues cognitive certainty, which can only come from the inherent certainty of nature, Fig. 1, so natural laws (axioms) have traceability. The essence of axiom is the universal truth of whether natural phenomena exist or not, so it can be observed and induced, self-evident but cannot be proved, and it is fundamental to worship and trust nature (certainty, absolute honesty). The significance of Newton's sufficient and necessary cause empirical inductive method is not limited to discovering axioms, but also can be used as the traceability condition of testing theories (axioms). According to Newton's natural philosophy [14], the three conditions for tracing the source of theory (axiom) are necessity, sufficiency and truth.

(1) Necessity, it should be understood as unique and necessary, because there is no certainty without satisfying uniqueness. Doing crossword puzzles with observation and induction, $1+1=2$ is necessary (axiom), $2=1+1$ is possible but unnecessary. Propositions (theories) can only be understood in this way, for example, Newton thought that "*The motion of the celestial bodies can only be explained by postulating attraction over great distances* [20]." The natural laws of physics are necessity laws [21].

(2) Sufficiency, proposition (theory) accords with all observation experience (100%). Not satisfying sufficiency is effective falsification, and sufficiency is logically equivalent to Popper's falsificationism. Different from the certainty of abstract concepts, definitions and the existence of phenomena, any observation accuracy is limited (uncertain), and the attribute of natural laws is certainty (100% true), so the sufficiency should not be denied or verified by observation accuracy. The electromagnetic force of celestial bodies affects the observation accuracy of gravity, but the law of universal gravitation cannot be denied for the accuracy.

(3) Truth, does not accept the creation hypothesis. Hypothesis is characterized by subjective prediction and speculation. Depending on empirical abstraction to define the ideal shape — circle (π), it is convenient to observe, compare and express the specific real shapes (for example, moon and apple), without predicting any specific real shapes, and is not creating hypotheses. Abstract consciousness gets simplicity, without the definition of circle, it will be very complicated and difficult to observe and express the circumference of the earth. Inertial frame is an idealized abstract concept of reference frame, which has the same epistemological significance as π . "Invariance of the speed of light" or "constant mass of the sun" is not in line with universal experience, but a creative hypothesis for predicting nature. Invariance of the speed of light is a clear violation of the axiom of relative velocity. Euclidean and non-Euclidean geometric postulates are obviously consistent with all observational experience (self-evident), and are certainly not creative hypotheses. To know the true shape of the earth, we can only rely on observation and induction, and any creation hypothesis is meaningless. Because nature is absolutely honest, truth is absolute, not relative.

Theoretical traceability is beneficial to reduce academic debates and confusion. Creative hypotheses that transcend universal experience risk falling into teleological views of nature, leading to hopeful wastage and loss. Both geometric postulates conform to all observational experiences, satisfy sufficiency, and obviously have no unique necessity, so they are not geometric axioms, so we can see that axioms and postulates are different. Experience shows that any position in absolute three-dimensional space is unique. Can this be regarded as a basic geometric axiom? It is a problem worthy of discussion.

Natural Philosophy Understanding of Photons

Light is an Electromagnetic Particle

To understand whether light is a wave or a particle, one should use the inductive thinking method of natural philosophy. According to the "how" attribute of natural matter, objectively induce how photons are generated, how they obtain energy, and how they interact with matter.

Wave-particle duality theory denies that light is a particle because of interference phenomenon, and at the same time explains the interference phenomenon of particles (electrons), which is self-contradictory and unable to be self-consistent. The proposal of wave-particle duality includes "it is inferred from interference phenomenon that light (A) is a wave (B), particles are different from waves, and photoelectric effect shows that light is a particle (C)". The logic of wave-particle duality is " $A = B$ and $B \neq C$ then $A = C$ ", which violates the axiom of equality transitivity, and of course has been falsified. Wave is an important form of matter motion, and particles exist as matter. The controversy between light waves and light particles for hundreds of years stems from their complete cognitive opposition [4]. The cognitive understanding of confusing waves with particles deviates from the fundamental logic of cognitive nature.

Light has double-slit interference phenomenon, so light is a wave; Obviously, it ignores the general experience that "waves cannot travel through vacuum and do not travel in a straight line". This judgment is neither induction nor deduction, but subjective thinking of "why" and teleological material view, and the conclusion is unreliable. After the discovery of electronic double-slit interference [22], this conclusion must be abandoned and a new understanding must be sought.

Electrons have double-slit interference phenomenon, electrons are electromagnetic particles, light has double-slit interference phenomenon, and light (possibly) is electromagnetic particles.

This judgment uses empirical induction, which is a simple induction (specific phenomenon cause) and has uncertainty. In order to understand the universal properties of photons, more phenomenon induction is needed. The following are some examples of understanding optical phenomena through the proposition of light as electromagnetic particles.

The discussion in paper [3] shows that the proposition of photon as electromagnetic particles accords with the existing optical phenomena, including diffraction and interference of light. In addition, it can also explain phenomena that can't be explained by existing theories, such as "unity of light wave phenomenon and particle property", "partial reflection of light", "polarization phenomenon of light", "particularity of X-ray refraction", "X-ray penetration characteristic", "photon energy is related to wavelength", "source of photon energy", "calculation of light speed", "light speed in vacuum seems to be constant", "relationship between total reflection and incident angle and light sparse and dense medium", "linear propagation of light", "atomic luminescence mechanism", "substantial unity of thermal mass theory and thermal kinetic theory", "photon kinetic energy leads to heat from high temperature body radiating more photons always flowing to low temperature body radiating less photons(it is natural)" and so on.

Photoelectric effect, Compton effect, light is a particle;

The wavelength threshold of photoelectric effect is temperature sensitive, which shows that photon wavelength is related to kinetic energy (temperature);

The ionization ability of X-ray is very strong, which is well explained by the fact that X-ray is a positive photon, and its refractive index is opposite to that of common light sources;

Magneto-optic, electro-optic and mechano-optic phenomena, and universal material luminescence phenomena, show that light is closely related to electromagnetism, acting force and matter;

Triboelectric phenomenon, heat generation by friction, chemical reaction atomic rearrangement and heat release, electricity and heat can be transferred (immortal), and both electricity and heat (photons) exist as substances;

Gas compression generates heat (photons), and the spatial existence (possession) of light particles;

Light (heat) can pass through vacuum, but sound waves cannot pass through, and light has particle characteristics;

The polarization direction of light significantly affects the photoelectric effect, which accords with the characteristics of electromagnetic particle directivity and electromagnetic interaction;

Spectral correlation of optically pumped light sources, and photon energy corresponding wavelength are particle characteristics (without energy superposition attribute of field);

Neutron impact nuclear reaction releases photons, and at the same time, mass loss, light has mass and is a particle;

Light sail experiment, light has kinetic energy and momentum, and the change of momentum of light reflection indicates that the speed of light is variable;

The penetrating power of uncharged neutrons is stronger than that of charged protons and electrons, and the penetrating power of uncharged neutrinos is stronger than that of photons, photons may be charged;

The atomic model shows that the subatomic electromagnetic field inside the material is extremely uneven [3], the negative electric field of electrons and the positive electric field of protons always coexist adjacent to each other, the electric field drop is greater than $2 \times 10^{13} \text{V/mm}$, and the distant electric field outside the material is approximately zero. Microscopic electromagnetic force is terribly greater than gravitational force 1036~1042 times. The tiny charged photons at the edges of materials are bound to be in a strong electromagnetic field at subatomic scale, and the gravitational field and repulsive field always exist at the same time. It is an inevitable phenomenon that photons diffract at the edge of materials and split into fringes. The formation mechanism of double-slit interference fringes of electrons and photons is the same. The double-slit interference fringes of single photon do not need one photon to pass through two slits at the same time, but it is inevitable that enough time (or number of photons) is needed [23].

The experience of photon as electromagnetic particles is very rich, and the certainty of inductive conclusions is increased, but these conclusions are impossible to prove, which accords with the cognitive law of empirical induction. Of course, this does not deny that electromagnetic theory is an easy-to-use mathematical method [3]. The electric field of charged particles has no force on themselves, which shows that electrostatic force is the action between charged particles, not the action between field and charged particles. Electric field does not exist in matter, so does magnetic field. There is no passive electromagnetic field in flight (electromagnetic wave).

The optical phenomena accumulated in the past several hundred years can be explained by photons as electromagnetic particles, which shows that the theory of photons as electromagnetic particles is sufficient.

At present, "it can only be understood in this way", and it is difficult to find other theoretical explanations, which shows its necessity. It is also true to induce photon properties from optical phenomena. The theory that light is an electromagnetic particle is sufficient, necessary and true, and should be considered correct until it is found that it violates universal experience (falsification).

Discussions on Photon Kinetic Energy

Photons are the main carriers of available energy, including solar energy, nuclear energy, fossil energy and so on. Photon is an electromagnetic particle that flies at the speed of light. How do photons get kinetic energy?

100% of matter is made up of charged particles, including electrons, protons and their combination — neutrons. The status of electrons and protons, like the bricks that make up the edifice of matter, is essential, ubiquitous and widely used (unlike some scarce short-lived particles). The charge-mass ratio of electrons is far greater than that of protons, and electron acceleration performance is very good, electrons are the absolute main force of electrostatic balance movement. There will be a very strong impact between electrons and protons, and it is common experience that impact leads to fragmentation. The universal photon motion characteristic "scattered away" is different from the "orbital" motion of the gravitational field of stars, which accords with photon characteris-

tics generated by strong repulsion field.

According to the existing experience of material composition, without considering the orbital photon release in strong gravitational field, the new photon (electromagnetic particles) can only come from the impact breakage of electrons and protons (including neutron impact), and the photon kinetic energy can be obtained by electrostatic repulsion field. Photons should have orbital motion, refraction and diffraction in strong gravitational electric field, and reflection and scattering in repulsive electric field [3].

Atoms are Electromagnetic Behemoths: In the sub-nanometer atomic space, the electric field strength reaches the order of 20 million volts per nanometer, and the magnetic field on the electron surface can reach 100 Tesla. For this reason, the motion of photon (electromagnetic particles) in the material is definitely not a straight line, and it must be a detour. Photons accelerate in gravitational field and decelerate in repulsive field inside atoms, and the macroscopic velocity is an average velocity. The average light speed of macroscopic refraction is less than the light speed constant in vacuum, and the proportional coefficient is the refractive index of materials. The paper [3] understands the acceleration phenomenon of photon refraction at the interface, which is not contradictory to the fact that the average speed of light in macroscopic refraction is less than the constant of light speed (experimental observation). A puzzling question is: What is the relationship between the magnetic field of macroscopic current and the magnetic moment of microscopic moving electron?

Neutrons Hit Atoms: In the material world, electrons, protons and neutrons can collide with atoms. Gravitational impact and repulsive scattering of particles are the general experience. It is highly probable that electrons will hit the nucleus, because the mass of electrons is too small and the impact impulse is not large. It is a great probability that protons hit orbital electrons, and the impact impulse is not large. Neutron has its particularity, and it has a high probability of hitting nucleus or orbital electron. When neutrons rush to the nucleus, the electrons in the neutron assembly must be located at the front end (the influence of nuclear positive gravity) and impact the protons in the nucleus. What is important is that the impact impulse is very large, which is approximately 1836 times of the impact impulse of electrons or protons. It is expected that a strong neutron impact will produce significant charged particle breakage, releasing huge energy (photon kinetic energy) and resulting in mass loss. This is consistent with the successful experience of existing nuclear energy applications, and the energy control of nuclear power plants is regulated and controlled by neutrons.

Compared with neutron impact and electron impact, the acceleration of electron impact should be greater. Does electron impact (bremsstrahlung) release more electromagnetic wave (luminescence) energy? Not in line with experience. The result of neutron impact releasing more energy does not support the theory that only electrons bremsstrahlung photons. The impact impulse of charged particles rather than impact acceleration significantly affects photon generation, which involves the nature of light, the mechanism of matter luminescence and nuclear energy.

Neutron impact produces huge energy, which is not limited to the existing nuclear fissile materials in theory. Can this bring infinite future prospects for clean energy development?

Because neutrons are electron-proton complexes, the electrostatic force between neutron and electron or proton is very special, the long-range force is basically zero, and the short-range force is very large, which is so similar to the short-range strength phenomenon of nuclear force? Weak universal gravitation and strong electromagnetic force models are all infinitely distant. Why is the operating distance of strong and weak nuclear force short-range model so special? It is subjective thinking "why" nuclear force releases the energy of light particles, and thinking about "how" nuclear force is converted into kinetic energy of light particles is obviously more in line with Newton's natural philosophy.

Will neutrons and nuclei be impacted by light particles with kinetic energy and decompose? Decay?

A Little Inductive Imagination of Limited Experience: the proton in the nucleus has a large mass, the negative photon hitting it

has a small mass, and the probability of proton escaping is low. The electron mass in the nucleus is small, the positive photon impacting it has a large mass, and the probability of electron escape/ β decay is high. The combined action of neutron capture and beta decay will lead to nucleus growth. For heavy nuclei, their ability to bind protons is not strong, and β decay may evolve into neutron emission, fission and α decay, accompanied by γ decay. The maximum unstable state of heavy nuclei may lead to fission reactions such as neutrons excited by negative photons. If electrons in the nucleus are not easily impacted by positive photons, the probability of decay will decrease.

Paper [3] puts forward the model of positive photon and negative photon, so there should be a combination of positive photon and negative photon. Is this the source of neutrinos?

Conclusion

Cognitive certainty is the common pursuit of natural philosophy and epistemology, which determines that they are logically consistent and complementary. The quaternary cognitive model of natural philosophy is a new exploration to deeply understand natural philosophy and epistemology, which puts forward a new exposition that cognitive certainty can only come from the inherent certainty of nature, so it is necessary for human beings to worship and trust nature (certainty, absolute honesty). Causal thinking method is extensive, complex and effective. Induction and deduction are the basis of the effectiveness of causal thinking, and the three causes of thinking put forward a new understanding of causal complexity. Natural philosophy (natural law) has traceability, and natural philosophy can perfectly answer the cognitive problem of light.

References

1. Hooper DC (2023) On the purpose of physics. *Nature Physics* 19: 466.
2. Steffen Ducheyne (2012) The Main Business of Natural Philosophy: Isaac Newton's Natural-Philosophical Methodology, 22.
3. Yuan D, Liu Q (2022) Photon energy and photon behavior discussions. *Energy Reports*. 8: 22-42.
4. Bolotin A (2021) Wave-Particle Duality and the Objectiveness of "True" and "False". *Foundations of Physics* 51: 1-27.
5. Solari HG, Natiello MA (2022) Science, Dualities and the Phenomenological Map. *Foundations of Science*, 1-10.
6. Steffen Ducheyne (2012) The Main Business of Natural Philosophy: Isaac Newton's Natural-Philosophical Methodology. 301.
7. Steffen Ducheyne (2012) The Main Business of Natural Philosophy: Isaac Newton's Natural-Philosophical Methodology. 73.
8. Gärdenfors P, Stephens A (2018) Induction and knowledge-what. *European Journal for Philosophy of Science*. 8: 471-91.
9. Steffen Ducheyne (2012) The Main Business of Natural Philosophy: Isaac Newton's Natural-Philosophical Methodology. 60.
10. Steffen Ducheyne (2012) The Main Business of Natural Philosophy: Isaac Newton's Natural-Philosophical Methodology. 259.
11. Elliott JR (2018) Aristotle on the Archai of Practical Thought. *The Southern Journal of Philosophy*. 56: 448-68.
12. Dewey J (1958) *Experience and nature* (Second Edition.), 20 (DOVER PUBLICATIONS, INC. NEW YORK).
13. Hubert M (2021) Understanding physics: 'What?', 'Why?', and 'How?'. *European Journal for Philosophy of Science*. 11: 85.
14. Steffen Ducheyne (2012) The Main Business of Natural Philosophy: Isaac Newton's Natural-Philosophical Methodology. 109-20.
15. Steffen Ducheyne (2012) The Main Business of Natural Philosophy: Isaac Newton's Natural-Philosophical Methodology. 34: 250-64.
16. Verreault-Julien, P (2019) Understanding does not depend on (causal) explanation. *European Journal for Philosophy of Science*. 9: 18.
17. Steffen Ducheyne (2012) The Main Business of Natural Philosophy: Isaac Newton's Natural-Philosophical Methodology. 5.
18. Davies EB (2003) The Newtonian Myth. *Studies in History and Philosophy of Science Part A*, 34: 763-80.
19. Belkind O (2018) In defense of Newtonian induction: Hume's problem of induction and the universalization of primary qualities. *European Journal for Philosophy of Science* 9: 14.
20. Steffen Ducheyne (2012) The Main Business of Natural Philosophy: Isaac Newton's Natural-Philosophical Methodology. 289.
21. Linnemann, N (2020) On metaphysically necessary laws from physics. *European Journal for Philosophy of Science* 10: 23
22. Frémont F (2014) Young-Type Interferences with Electrons. 35-40.

23. Qi WR., Liu R, Kong LJ, Wang ZX, Wang TH (2020) Double-slit interference of single twisted photons. Chinese Optics Letters, 18: 102601.

Submit your next manuscript to Annex Publishers and benefit from:

- ▶ Easy online submission process
- ▶ Rapid peer review process
- ▶ Online article availability soon after acceptance for Publication
- ▶ Open access: articles available free online
- ▶ More accessibility of the articles to the readers/researchers within the field
- ▶ Better discount on subsequent article submission

Submit your manuscript at

<http://www.annexpublishers.com/paper-submission.php>