Science: Newton versus Einstein

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Abstract. The Scientific Revolution matured in the seventeenth century through **Newton's science,** which has continued into the beginning of the twenty-first century, in which the entire scientific community still follows the mechanical universe approach. However, this first scientific enlightenment continues to linger despite an avalanche of discoveries of the laws of nature. Science **inevitably** needs the second scientific enlightenment, **Einstein's science** of principle theory and the cosmos, to **transform** itself. In this paper, we first describe the Scientific Revolution thus far. We then apply the second scientific enlightenment to examine the first one currently practiced in elementary particle physics and cosmology. Finally, we use our two new discoveries in Einstein's science, *the success/failure system* and *cosmic inertia,* to elucidate and declare the second scientific enlightenment. This paper is **our sober reflection on science** and on our progressive learning of Einstein's science, which we have set out in earlier papers that we suggest examining before studying this paper.

Keywords Einstein, Law of nature, Newton, Principle theory, Science, The cosmos, The mechanical universe

1 Introduction

Einstein said, "It is enough for me to contemplate the mystery of conscious life perpetuating itself through all eternity,"[1:330] "He wants to experience the universe as a single significant whole,"[2:38] "a great, eternal riddle,"[1:338] and "The scientist is possessed by a sense of universal causation….His religious feeling takes the form of a rapturous amazement at the harmony of natural law, which reveals an intelligence of such superiority that, compared with it, all the systematic thinking and acting of human beings is an utterly insignificant reflection."[1:333;2:40]

However, during his life (1879–1955), Einstein did not uncover any laws of nature concerning life or any laws completely governing the universe as a whole. While his 1915 work on general relativity defined the macrocosmos concerning celestial bodies in the present universe, this did not reflect the universe as a whole. Instead, he defined a scientific task[1,2] called *Einstein's cosmos* and offered a methodical approach[1,2] called *principle theory.* We have been privileged to use principle theory and Einstein's cosmos to uncover laws of nature[3-8] ruling the mesocosmos in which we live, called the success/failure system with $\mathbf{PO}_{\text{conditions for success}} = \mathbf{PO}_{\text{causes of failure}}$, and laws of nature[9-13] ruling the universe as a whole, called cosmic inertia with $\mathbf{E = mc^2}$ and the constant of nature $\boldsymbol{\alpha}$.

With these two new discoveries, we have further realized that the Scientific Revolution inspired by Newton's science needs the next scientific enlightenment inspired by Einstein's science to advance. We refer to Newton's science and the mechanical universe approach as the first scientific enlightenment, which is still practiced by the current scientific community, and Einstein's science as the second scientific enlightenment, which is relatively unknown to the scientific community at this point in time. This paper elucidates and declares the second scientific enlightenment, which will further another avalanche of new discoveries relating to Einstein's cosmos with principle theory. The terms *Newton's science* and *the first scientific enlightenment* are used interchangeably in this paper, as are *Einstein's science* and *the second scientific enlightenment.*

2 The Scientific Revolution

Science has proved itself trustworthy due to its **methods** and **self-correction.** The Scientific Revolution matured as Newton's science in the seventeenth century. It may be anticipated that Einstein's science would emerge over Newton's science immediately after its birth in the first half of the twentieth century. However, the entire current scientific community still holds onto Newton's science and the mechanical universe approach. The Scientific Revolution founded the modern notion of the **laws of nature,** which play an important role in concert with scientific methods. In this regard, Einstein's science is more rigorous and profound than Newton's science.

2.1 Newton versus Einstein

The Scientific Revolution began in 1543, when Copernicus proposed that the Sun rather than the Earth was at the centre of the planetary system.[14] Through the efforts of Tyco, Kepler, Galileo, and Descartes, **Newton** eventually developed his theory of gravitation, which includes gravity and the three laws of motion, in *Principia Mathematics* in 1687. He proudly stated in *Principia,* "I now demonstrate the frame of the System of the World."[14:48,49]

In the history of science, Newton was the first to address science in terms of *laws of nature* with cosmic-level scale. It is hard to overstate the importance of the effects produced by the success of Newton's science. We may compare endless debates and paradoxes in the earlier ages with the clarity and simplicity of these laws. Humanity could understand and deduce how the moons, planets, and stars should move. By the end of the eighteenth century, the Scientific Revolution led to the Age of Enlightenment, an intellectual and philosophical movement that dominated the world of ideas in Europe.[14] The Enlightenment approach considered knowledge to be developed by rationality and expected knowledge to be able to solve the fundamental problem of human existence.

However, despite the fact that Einstein's theory of relativity plays a heavy role in ongoing research, the scientific community is sticking to the first scientific enlightenment, Newton's science, but not the second one, Einstein's science. We may examine this situation by looking into the now outer frontier of scientific knowledge: the theories of gravitation and cosmology, and elementary particle physics.[15,16] Although elementary particle physics and cosmology are integrated through the theory of gravitation, elementary particle physics mainly addresses the logical structure of matter, while cosmology focuses on the history of the empirical universe.

The following quote from Newton reflects the current scientific practices: "I wish we could derive the rest of the phenomena of nature by the same kind of reasoning from mechanical principles [Weinberg supposed that he meant as in the *Principia*] for I am induced by many reasons to suspect that they may all depend on certain forces,”[15:20] as quoted by Nobel prize winner Weinberg. Today, the mechanical universe approach centres the universe around the four forces: gravity, the electromagnetic force, the strong nuclear force, and the weak nuclear force.[10,15,16] In other words, the scientific community sticks to Newton’s science. **That we have moved to Einstein’s science is, as opposed to common sense, a false impression.**

Einstein developed the concept of principle theory and the cosmos.[1,2] The principle theory approach is a scientific method that guides scientists to define the structure of the universe in logical unity, with the final product called a principle theory. Einstein’s cosmos is understood as a single logical system of the universe as a whole. One reason that the scientific community may disregard Einstein’s cosmos and principle theory is that Einstein published his concepts in popular literature, which may not interest the scientific community.[13] Even Nobel prize winners Feynman[17,18] and Weinberg[15,16] and the famous scientist Hawking,[19] who wrote popular books for the general public, did not acknowledge Einstein’s cosmos and principle theory. The Scientific Revolution concerns new scientific methods and tasks. General and special relativity were scientific discoveries, but not new scientific methods. However, they are products of the principle theory approach.

Thus, when we refer to Einstein’s science, we mean Einstein’s principle theory and the cosmos.[1-13] From the perspective of producing the laws of nature, Einstein’s science subsumes Newton’s science.[13] **With the mechanical universe approach, Newton’s science addresses some kinds of laws of nature and aims to uncover the laws of nature in the universe, a methodical limitation not currently acknowledged by the scientific community.** By contrast, Einstein’s science addresses all kinds of laws of nature and intends to uncover all of the laws of nature in the universe. It is unfortunate that the entire scientific community clings to the first scientific enlightenment rather than the second one. This lamentable fact motivated us to develop this paper to promote Einstein’s science in the context of the Scientific Revolution.

2.2 The laws of nature

Great scientists who create scientific methods must also enlighten the *laws of nature,* which are the final products of scientific methods. **In seeking the laws of nature, one needs to know what one is looking for, or one cannot expect to find anything.** The empirical world does not simply provide validation for the laws of nature. In Einstein’s science, we must rely on nature as the sole authority.[1,2] **Thus, Einstein understood**

what the laws of nature are.

To discuss the laws of nature in the first scientific enlightenment, we refer to Feynman's work. Feynman[17] published *The Character of Physical Law,* which includes a series of lectures on the law of gravitation, the relation of mathematics and physics, the great conservation principles, symmetry in physical laws, and seeking new laws. He considered that understanding the general character of physical laws can aid in uncovering new laws. However, in his last lecture on seeking new laws, he stated that he was sure that history does not repeat itself in physics, even if he had already extracted the character of physical law systematically from the already known laws for our reference.[17] The most salient character of the laws of nature that we can learn from Feynman and Newton's science is that laws of nature can be *represented* as *simple mathematical laws.* In fact, although Feynman hoped to teach how to seek a new law by creating a new one at the end of his lectures, he failed to do so.[17]

We now turn to the second scientific enlightenment. Einstein's principle theory and the cosmos provide many ideas concerning the laws of nature: "The general public may be able to follow the details of scientific research to only a modest degree; but it can register at least one great and important notion: the confidence that human thought is dependable and natural law is universal,"[1:387] "All physical theories, their mathematical expressions notwithstanding, ought to lend themselves to so simple a description that even a child could understand them,"[1:380] "For me, a hypothesis is a statement whose *truth* is temporarily assumed, but whose *meaning* must be beyond all doubt,"[1:364] and "The most beautiful gift of nature is that it gives one pleasure to look around and try to comprehend what we see."[1:446]

When we tackle Einstein's scientific thoughts on principle theory and the cosmos above, we can derive some useful information concerning the laws of nature. First, both the scientific community and the general public can have confidence in dependable universal laws. **They are first-order scientific discoveries.** Second, we know well what the laws of nature *express:* **the laws of nature can be experienced empirically and understood logically, symmetrically.** We may say that the laws of nature have the **intrinsic principles of symmetry.** It is due to this characteristic that all laws of nature in Einstein's science are theories, principle theories, and symmetry-principle theories.[10] Third, even if no one experiences and understands any laws of nature in the universe, e.g., at the dawn of humanity, all of the laws still exist, waiting to be discovered on Earth (or elsewhere). They are independent of the human factor. Finally, the laws of nature are more certain than any other human knowledge.

Thus, Einstein's science raises the level of the laws of nature from *representation* to *expression.* In contrast to the laws of nature, *pure mathematics* can only represent something, but not necessarily express reality, as Einstein said, "[We] would not need to envy the mathematician if the propositions of mathematics referred to objects of our mere imagination, and not to objects of reality."[2:233]

We give some examples of the components of the laws of nature concerning expressions. The force concept is both empirically and logically real with cosmic-level scope. We can experience it according to the senses of pull and push on Earth.[13] Furthermore, as a universal law of nature, gravity interconnects all of the parts (celestial bodies) as a whole. In other words, Newton's theory of gravitation has taught us that there is one and only one universe.[13] In a traditional field theory like general relativity, which considers gravity creatively with warped time and space, you can feel that field if one holds a piece of iron in one's hand and extends it toward a magnet.[15,16]

In quantum field theories of elementary particle physics, the matter particles are called fermions. Electrons and quarks are examples of fermions. Force fields are pictured as being composed of various elementary particles called bosons, which are force-carrying particles that fly back and forth between matter particles, transmitting forces. The photon, or light particle, is an example of a boson that transmits the electromagnetic force.[19]

Let us consider the foremost law of nature, $\mathbf{E = mc^2}$. It expresses the distribution, redistribution, and transformation of mass and energy across time and space. Thus, this law of nature is accompanied by the constant of nature $\boldsymbol{\alpha}$**,** representing the totality of existence.[13] We may feel in the here and now that the constant $\boldsymbol{\alpha}$ represents a fixed quantity and eternity, and vice versa. A final word about the laws of nature: whereas the general public rather than the scientific community may have great difficulty in understanding and applying scientific methods to a variety of problems, everyone can grasp the laws of nature with the intrinsic principles of symmetry easily.

3 The First Scientific Enlightenment

To declare the existence of the second scientific enlightenment, we need to compare it with the first scientific enlightenment. We use the laws of nature in Einstein's science to examine the first scientific enlightenment and reveal some problems of Newton's science as *scientific methods.*

3.1 Elementary particle physics concerning matter

From the perspective of elementary particle physics, the four fundamental forces have governed the evolution of the universe from the initial condition of the Big Bang into today's observed universe.[15,16] In fact, this field holds that the division of natural forces into four classes is probably artificial and a consequence of our lack of understanding. Scientists in this field have therefore sought a final theory of the universe that will unify the four forces of nature into *the ultimate laws of nature* that are compatible with quantum field theory.[15,16] We briefly describe the scientific progress in this endeavour.

The Standard Model[15,16] has unified the three forces – the electromagnetic force, the strong nuclear force, and the weak nuclear force – but not all four forces. Quantum gravity and string theory[15,16] intend to account for the unification of the four forces. Quantum gravity focuses on solving the relational time problem for achieving unification. String theory explores the hypothetical boson known as graviton. String theory is the only theory to have incorporated anything like gravitation. Furthermore, it has suggested that our universe is but one of an enormous number of separate and distinct universes, called the multiverse.[15,16,20]

We use Einstein's science[1,2] to examine elementary particle physics. First, we distinguish between intrinsic principles of symmetry, technical principles of symmetry, and mathematical principles of symmetry. Elementary particle physicists have used *technical* principles of symmetry, such as the gauge principle and the equivalence principle, to uncover the laws of nature that have *intrinsic* principles of symmetry.[10,15,16] Further, the enormous allure of string theory to physicists has emerged from the fact that strings vibrating in ten-dimensional spacetime have an enormous amount of purely *mathematical* principles of symmetry, which are not necessarily able to serve as technical principles of symmetry, unless they lead to discoveries of the laws of nature.[20]

Second, when we examine elementary particle physics with respect to the laws of nature in Einstein's science, quantum-gravity theory focuses on refining the pure logical view of the universe without acknowledging the need to describe what the quantum-gravity empirical universe that can enable such a theory looks like.[12,16]

Third, the success of string theory has two points in its favour: it accounts for gravity and it derives the multiverse.[16,20] The remaining tasks for string theorists is to pick up the correct universe among many universes. However, from the laws of nature in Einstein's science, this result is a deadly blow for beating down string theory.[13]

Gravity, the first law of nature on the scale of the universe, interconnects all of the parts into the totality of existence, leaving no possibility for the notion of the empirical multiverse. The scientific community fails to acknowledge this logical inconsistency simply because they remain in the first enlightenment. In other words, they are concerned with the representation rather than the expression (or meaning) of the laws of nature. Further, quantum gravity and string theory lack the components of the technical principles of symmetry to determine the laws of nature, i.e., intrinsic principles of symmetry.

Finally, a fundamental problem of elementary particle physics arises. The four forces plus the initial condition of the Big Bang are thought to govern the evolution of the universe. This was Newton's speculation after he had been successful in his theory of gravitation governing the universe.[15,16] This assumption has never been disputed. However, Einstein's science can easily challenge it. Since *nature is the origin of the laws of nature,* there must be nature, i.e., something beyond the four forces, that accounts for the (emergence of the) four forces and dominates the evolution of the universe.

3.2 Cosmology concerning the universe

Cosmologists[10,19] are interested in the history of the universe, including its creation, evolution, and ending, and perhaps, the laws of nature in the universe. In this paper, we consider that cosmology has the potential to address the universe rather than individual celestial bodies like black holes,[19] which, though enticing, do not account for the totality of existence. We describe the scientific progress so far.

About fourteen billion years ago, the Big Bang, where the universe was exploding, occurred. The universe is still expanding today, according to Hubble's indirect observations in 1929, and perhaps will be expanding with increasing speed towards infinity.[13]

The Big Bang is thought to have begun in a point with infinite energy (density) called a singularity. A singularity, zero quantity, and infinite quantity are pure mathematical concepts that Newton's science acknowledges. However, Einstein's science rejects these concepts because there are no empirical references. As Einstein said, "One may not conclude that the 'beginning of the expansion' [of the universe] must mean a singularity in the mathematical sense. All we have to realize is that the [field] equations may not be continued over such regions [of very high density of field and of matter]. This consideration does, however, not alter the fact that the ‘beginning of the world’ really constitutes a beginning, from the point of view of the development of the now existing stars and systems of stars.”[1:403]

There are many proposals concerning the evolution of the universe, which do not affect Einstein’s science and our arguments. We consider the proposal of Hawking and Mlodinow.[19] They applied Feynman’s formulation of quantum mechanics to the evolution of the universe, despite Feynman saying that he was sure that history does not repeat itself in physics. Hawking and Mlodinow proposed that, like a particle, the universe does not have just a single history, but every possible history, each with its own probability. To understand the evolution of the universe, we need to do a sum-over-histories *calculation.* This proposal also stated that because there is a law like gravity, the universe can and will *create* itself from *nothing* (and *destroy* itself into nothing?). We challenge this claim.[19] Gravity is not omnipotent and will excuse itself from this human responsibility. According to the laws of nature in Einstein’s science, the universe creates gravity, not the other way around. Furthermore, we do not believe that we can calculate the complex behaviours of the vast universe with sum-over-histories.

The expansion of the universe seems to be accelerating. For this apparent discovery, the 2011 Nobel Prize in physics was awarded to Perlmutter, Schmidt, and Riess. However, Einstein’s science[1,2,13] cannot allow an empirical universe like this, which will be discussed later. By contrast, Newton’s science has no way to judge the correctness of this observation.

Hawking was among the first to recognize the importance of understanding the laws governing us. However, human behaviours are not mechanical. Eventually, he and Mlodinow[19] proposed that since we cannot solve the equations that determine our behaviours, we may use the effective theory that people have free will. The study of our will, and of the behaviour that arises from it, is the science of psychology. Thus, this suggests that the science of psychology will provide the laws of nature. However, psychological concepts, such as ‘social support’ and ‘life satisfaction,’ are human-created concepts. When no authority creates such psychological concepts, they do not exist, in contrast to the laws of nature that are always there to be discovered.

A fundamental problem of cosmology arises. Cosmologists consider that the universe has a life span with a beginning (the Big Bang) and an end, which is opposed to the eternal view of the universe in Einstein’s science. Furthermore, as historians, they have found no or few laws of nature, even if they perceive an order in the universe, like an inflationary universe.[10] As such, they hold an attitude of humility and integrity. Just as Feynman said, "I think it's much more interesting to live not knowing than to have answers which might be wrong."[18:24]

Finally, we summarize and question the first scientific enlightenment from Einstein's science: The scientific community acknowledges that the mechanical universe is governed by the laws of nature, which are confirmed by empirical validation. However, we must acknowledge that *nature is the origin of the laws of nature* and that *the universe is "a great, eternal riddle"*[1:338] rather than **a life span from cradle to grave of waiting to be narrated and creatively over-narrated by amateur or expert scientists playing the role of historians.**

4 The Second Scientific Enlightenment

Einstein's science subsumes Newton's science.[13] Whereas Einstein's science can tackle the mechanical universe and the non-mechanical universe, Newton's science focuses only on the mechanical universe. Note that the universe can be viewed differently across levels and across times. The second scientific enlightenment includes principle theory and Einstein's cosmos. As a method is best learned by example in an application, principle theory and Einstein's cosmos are each elucidated by a new discovery in the non-mechanical universe below.

4.1 Principle theory

Einstein's principle theory includes "the production of some sort of order among [the connections of] sense impressions [in their totality], this order being produced [logically] by the [free] creation [of a minimum] of general concepts, relations between these concepts, and by definite relations of some kind between the concepts [and relations] and [the connections of] sense experience[s] [in their totality],"[2:292;5] "The intuitive grasp of the essentials of a large complex of facts leads the scientist to the postulation of a hypothetical basic law [principle], or several such laws. From these laws, he derives his conclusions…which can then be compared to experience. Basic laws [principles] and conclusions together form what is called a 'theory.'"[1:368;3]

The first thing that we can learn from this general methodical thinking is that the laws of nature are discovered by humans but are determined by nature and that they can be experienced empirically and understood logically and symmetrically. We apply principle theory to the mesocosmos, the level of our existence in the universe, to address the mystery of conscious life perpetuating through all eternity, a mystery that interested Einstein.[1]

We see and experience an order in the universe:[5] at the level of our existence, there can be failures in the universe, which makes it *an erring universe.* To reveal the hidden connections of sense impressions in their totality, we create minimum general concepts, such as *success*, *failure*, *part*, and *whole*, giving sense to 'A part succeeds,' 'A part fails,' 'The whole succeeds,' and 'The whole fails.' Then, we reveal the relations between these concepts. This brings us to *a general fact:* if something (the whole) depends on another thing (a part) for its *conditions for success,* then it depends on that thing for its *causes of failure,* and vice versa. We have just discovered two dependency relations for *conditions for success* and *causes of failure* over the *part-whole* relation.

To account for the complexities of sense experiences and the hidden success/failure connections of sense impressions in their totality, we require the part-whole relation to be a one-many relation, such that the whole depends on one to many parts. We also allow a succession of part-whole relations *ad infinitum,* which forms a partial ordering structure (PO). Therefore, the dependency relation of the conditions for success has the properties of reflexivity, anti-symmetry, and transitivity, as does the dependency relation of the causes of failure. Based on the above analysis, we rationally know the order in the erring universe, as reflected in the logical structure of the universe at this mesocosmic level.[5]

We used the above logical constructions and deductions to achieve a principle theory called the success/failure system principle and hypothesis.[3] To develop the success/failure system hypothesis as a principle theory, we required the essentials of a large complex set of facts, discovered above as *the general fact*. By considering this general fact, which reflects such mathematical concepts as the dependency relations of the *conditions for success* and the *causes of failure* and requires discrete mathematical reasoning, as an axiom, we developed a hypothetico-deductive system to obtain the success/failure system principle. From this principle, we deduced the hypothesis that every planet has the potential to evolve into a success/failure system, like Earth. The success/failure system principle[3] is formulated as

$$\mathbf{PO}_{\text{conditions for success}} = \mathbf{PO}_{\text{causes of failure}}$$

This can be read as "in the part-whole structure of a success/failure system, there exists a partial ordering for the dependency relation of the conditions for success, as there is of the causes of failure, symmetrically."[9] This principle has been expressed without force.

Several points can be learned from this application. First, only principle theory can uncover the laws of nature for the mesocosmos. Only Einstein comprehended the existence of the mesocosmos.[9] Einstein's science acknowledges the importance of the origin of the laws of nature. The mesocosmos is the origin of the success/failure system. Einstein said, "If God created the world, his primary concern was certainly not to make its understanding easy for us."[1:342] **In this regard, Newton's science often disregards the origin of the laws of nature, limiting the ability of the scientific community to come close to an understanding of the laws of nature governing us. Perhaps these experts are immersed in pure logical or even psychological thinking without a consideration of the laws of nature.**

Second, we see that free creation and logical analysis help to create the laws of nature as intrinsic principles of symmetry. Once principle theory is used to analyse an erring universe, it will become difficult to imagine that the law of nature for the mesocosmos could not be anything but the success/failure system.[5]

Third, **scientific axiomatic systems** have axioms that must be connected to the empirical world, outside of the axiomatic system itself, as opposed to **mathematical axiomatic systems,** e.g., Euclidean geometry, which have definitions and axioms as self-evident truths that are part of the human-created system.[6]

Fourth, we need a culture of respecting basic laws of nature. Science allows us not only to understand but also to respond. Our current scientific culture tends to follow the concept of *exploitation,* which leads to a grave deterioration of the homo-ecosystem at this point in time. With our understanding that we live in the mesocosmos, where success/failure systems permeate on Earth, which itself is the largest success/failure system in our planet, our scientific culture should obey the concept of *conservation*.[6] **The biosphere's sustainability is humanity's ultimate concern.**[3]

However, one of our colleagues laughed at the clarity and simplicity of the success/failure system, saying that any decision trees in the science of complexity, a disciplinary field without the laws of nature, would be mathematically more sophisticated than the success/failure system. In fact, he failed to appreciate this law of nature. Further, he did not understand that the success/failure system hypothesis provides reason for the existence of astrobiology.[4]

Finally, to say that the success/failure system is the only universal law in biology would irritate all biologists on Earth. Outsiders are not allowed to make great contributions to a discipline. This is a taboo in current scientific practice. However, we must say that the laws of nature are independent of human authority, thus supporting academic freedom. **Ideally, regardless of his status, whosoever discovers the laws of nature would get *credit* for the discovery. Laws of nature are easily traced to the discoverer.**

4.2 Einstein's cosmos

Einstein wanted to experience the universe as a whole.[1,2] Thus, the cosmos refers to a theory of the universe as a whole. Further, Einstein considered that the universe as a whole is "a great, eternal riddle."[1:338] However, a great, eternal riddle is not easy to experience and understand. Fortunately, we have at our discretion the foremost law of nature, $\mathbf{E = mc^2}$, from logic and the Big Bang empirically. There are no clearly intrinsic principles of symmetry. What we must do is to build a complete experience and understanding of the universe as a whole as a principle theory, that is, the laws of nature.[9-13]

We begin with the logical perspective. $\mathbf{E = mc^2}$ was considered by the scientific community as a limiting case that played a decisive role in the investigation and development of nuclear energy in World War II. However, it is an unacknowledged comprehensive law that defines the distribution, redistribution, and transformation of mass and energy in the universe as a whole. In particular, this law is accompanied by the constant of nature $\boldsymbol{\alpha}$**,** which denotes the totality of existence in the universe. As the empirical universe evolves, this totality of mass and energy distributes, redistributes, and transforms while maintaining its finite, overall volume. Surprisingly, among those constants, Newton's science never includes this foremost constant of nature $\boldsymbol{\alpha}$ in the list of cosmological constants.[9-13]

From the empirical perspective, if the totality of mass and energy is infinite, the Big Bang will continue its expansion forever. Since the totality of mass and energy is never infinite, the universe must oscillate as an endlessly expanding and contracting universe. Further, since the universe as a whole has nothing acting on it (as an axiom), we define the behaviour of an oscillating universe that is due to cosmic inertia. Thus, regarding the universe as a whole, the laws of nature are cosmic inertia with

$\mathbf{E = mc^2}$ and the constant of nature $\boldsymbol{\alpha}$.

This is a complete experience and understanding of the universe as a whole.[9-13] Aristotle said, “The whole is more than the sum of its parts.”[5] Cosmic inertia reflects the universe as a whole, thus reflecting Aristotle’s saying in the largest context. Einstein was right to consider the universe an eternal riddle.

It is hard to exaggerate the importance of the effects produced by this success of Einstein’s science, “which reveals an intelligence of such superiority that, compared with it, all the systematic [or worse, unsystematic] thinking and acting of human beings is an utterly insignificant reflection.”[1:333;2:40] Thus, after having obtained cosmic inertia for the universe as a whole, we question Newton’s science. Newton’s science holds a partial picture of universal causation with forces, without acknowledging that **the universe as a whole is the ultimate origin of forces,** a fact that should challenge wild guesses of the origin of forces by the scientific community. As the laws of nature of cosmic inertia can be uncovered by principle theory, we reject the fragmented historical approach adopted by cosmologists and amateurs before cosmic inertia that perceives the universe as a whole as **a bewildering universe(s)**. **Now, scientists must follow cosmic inertia by re-comprehending the universe and re-examining Newton’s science. This will advance the second enlightenment that started with Einstein.**

We earlier mentioned the observed accelerated expansion of the universe as a whole,[13] for which the 2011 Nobel Prize in physics was awarded. When the observed universe could be erroneous, the fragility of Newton’s science is revealed. **Science is self-correcting,** for the scientific community is always willing to reconsider what has previously been accepted, even when that concept has been credited with the Nobel prize. By contrast, Einstein’s science is robust facing this probably erroneous observed universe, since an infinite accelerated expansion is contradictory to the constant of nature **α,** thus breaking an intrinsic principle of symmetry. Indeed, the empirical universe is truly hard to perceive, just as Einstein said, “I have second thoughts. Maybe God is malicious.”[1:374]

However, cosmic inertia may also face difficulties in gaining acceptance from the scientific community because it was not discovered by physicists, but by an outsider who is not totally intoxicated by Newton’s science. If so, it will be an insult to Einstein and his science. However, truth cannot be clouded forever.

Finally, we have been afraid of the delay of two scientific discoveries of the laws of nature, **the success/failure system** and **cosmic inertia,** during our lifelong learning of seeking and solving problems of a scientific nature.[3-13] We strongly feel that scientific journals may not be really interested in the discoveries of the laws of nature, since they have anticipated an endless academic enterprise. They do not like the laws of nature to make a *definite* advancement. **Constant business and research opportunities have sacrificed opportune scientific discoveries**.

5 Conclusions

Einstein said, "Science can only be created by those who are thoroughly imbued with the aspiration toward truth and understanding."[2:46] **In the Scientific Revolution, Newton and Einstein are two figures who have clearly reflected science in terms of the laws of nature.** Both have made scientific discoveries and illuminated new scientific methods for the scientific community. In this paper, we claim our discoveries of two new laws of nature, *the success/failure system* and *cosmic inertia*, and declare the existence of the second scientific enlightenment, *Einstein's science,* which includes principle theory and Einstein's cosmos.

Who was the figure to distinguish Einstein's science from Newton's science and thus enlighten science? It is us, the third figure. It is not Feynman, Hawking, Weinberg, or others. It is also not philosophers who elucidate Newton's or Einstein's philosophies of science or paradigm shifts. It is by no means those who distinguish the theory of gravitation from general relativity or use the latter instead of the former in the literature, including Einstein's biography, elementary particle physics, and cosmology. It is not even Einstein who distinguished between the two theories of gravitation, Newton's theory and general relativity. All negative responses from the scientific community to Einstein's science strongly show that the entire scientific community clings to Newton's science. **Our innocent remark:** how can one who knows nothing about **Einstein's science** dare to say that they know science and the laws of nature?

We live in the universe as a single significant whole, the cosmos, rather than simply in the mechanical universe. Thus, *cosmic inertia* is a law of nature that even a child could understand. Due to a partial picture of universal causation with forces, **Newton's science** leaves much more room for humanity's authority, expressed as pure mathematics and creativity, **to develop pseudo-science** with credits (commendable but without genuine laws of nature) and illusions and interpretations (paradoxical but without debates) than **Einstein science,** which utterly depends on the sole authority, **nature.** These are the symptoms and diagnosis of the lingering status of Newton's science, notwithstanding the scientific community's tacit understanding and ignorance. **The laws of nature that have intrinsic principles of symmetry can cure the malady**

of the *pseudo-science of bizarre illusions and incomprehensible interpretations* among the scientific community and the general public. We believe that the scientific community will **inevitably** move from **Newton's science** to **Einstein's science.** In addition to the forces noticed by Newton, "Look into nature, and then you will understand it better,"[1:95] said Einstein. **Science concerns all of the laws of nature in the cosmos. Everything else is details.**

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