

A Comparative Study: Hawking's Quantum Cosmology with Taoism

Zhuhong Z*

School of Philosophy, Wuhan University, China

***Corresponding author:** Zhou Zhuhong, School of Philosophy, Wuhan University, Wuhan HuBei 430072, P. R. China, Tel: 86 027- 68764004; Fax: 86 027- 68764004; Email: zhoudenya@msn.com

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Abstract

The scientific ideas of **Hawking's** quantum cosmology are full of the meaning of metaphysics which are hard to be accepted by orthodox scientific circle, but there are some similarities with Chinese Taoism. By a comparative study we believe that the idea of *Unity of nature and spirit* which was carried on and developed by Kant and Hegel will become the new dayspring of modern scientific thoughts, and the wisdom of *Unity of heaven and human* in Taoism could enlighten us think it again.

Keywords: Hawking's quantum cosmology; *Unity of heaven and human*; Taoism

Stephen Hawking is a unique and towering figure in modern physics, perhaps the most famous scientist since Einstein. His quantum cosmology presents the first universe self-contained solution, which describes the spontaneous creation of an exponentially expanding universe. Hawking persists in that we should depend on scientific reason to answer how the universe starts and ends, not relay on different human's power. This question was really one of metaphysics or theology early.

The universe self-contained solution is just a brief math model like a toy and a scientific hypothesis which has not been proved by astronomy observation yet. But science group have paid a great attention to it and generally think that Hawking's work is very outstanding, indicating the foreground of modern cosmology.

At the same time the ideas of Hawking's cosmology have got many comments and oppugns from scientists and philosophers. The most important reason is that the

scientific ideas inside the universe self-contained solution Hawking elucidate by math language are full of the meaning of metaphysics. These thoughts, such as: the universe is created out of nothing; The Boundary Condition of the Universe Is That It Has No Boundary; the universe holds all possible histories; The universe in a Nutshell; The partial reason why the picture of the universe we observe is such is the existence of intelligent beings ..., possess great speculative quality which are hard to be accepted by orthodox scientific circle.

It is interesting that there are some similarities between Hawking's cosmology, the newest scientific ideas, with Chinese Taoism, the oldest Oriental wisdom. It is a miracle. So, some scholar's think that the analogy between them have opened out the new significance of Taoism to modern science. At same time the traditional Taoism, which set up its natural theory basing on naïve intuition and talented gifted speculation,

would be in the bloom of new youth if it can get help from modern science.

Certainly it is a significant work. We would feel national pride as Chinese if the advancement of modern science needs to obtain idealistic resource from Chinese traditional wisdom. Whereas we must pay attention to that the quantum cosmology may transcend its idealistic plight helped by occidental philosophic tradition, especially the dialectic reason which is coming of old Greece, inherited by Kant, developed by Hegel. We show the reasons as follow.

The Universe is Created out of Nothing

Tao is the core word of Taoism. Lao Tzu has purely reflected on Tao-self in his masterpiece, *Tao Te Ching*. Tao of Lao Tzu has double meaning, law of nature and origin of universe. The Origin of universe means that everything of universe are birthed from it or constituted by it. It is generally regarded as something which have been existed or kinds of occult power transcending the universe. But Lao Tzu regarded it as creativity-self. As the Origin, Tao is being, and appear to be One. "Tao gave birth to the One; the One gave birth successively to two things, three things, up to ten thousand"¹.

This One is the power of congregativeness and unification, which bring heaven and earth and everything to be. So Tao-itself don't exist in space- time and can't become the object of human sense. Tao-itself can't be seen, can't be listened to, can't be touched, so much as can't be said "Because the eye gazes but can catch no glimpse of it, it is called elusive. Because the ear listens but cannot hear it, It is called the rarefied. Because the hand feels for it but cannot find it, It is called the infinitesimal"². "The Way that can be told of is not an Unvarying Way; The names that can be named are not unvarying names"³. Being, as Tao, is Not-being. Tao-itself, as Not-being, is unable to be defined, so Not-being hasn't any definition. But Not-being, as Tao, isn't true nothing. It is the power to create. "For though all creatures under heaven are the products of Being, Being itself is the product of Not-being." , "Not-being, Heaven and Earth sprang; Being, the mother that rears the ten thousand creatures, each after its kind"⁴. It is obvious that Tao is the unification of Not-being and being, moreover Not-

being is of the essence. Generally Lao Tzu regards Not-being as nothing, an original state of nothingness, not the power to create.

Where did the universe come from, and where is it going? Did the universe have a beginning, and if so what happened *before* then? It was generally accepted by classical science that there are no the question of creation or genesis because the universe had existed forever in an unchanging state, or the question of whether or not it had a beginning was really one of metaphysics or theology. But the modern cosmologies not only believe the universe has a beginning or an end, but also put forward some models of the universe genesis and evolvment. Hawking's universe self-contained solution is one of them. This solution answer the question of genesis as follow: the universe is created out of nothing⁵; The Boundary Condition of the Universe Is That It Has No Boundary⁶; the Universe is self-contained⁷. In other words, the Universe doesn't need anyone to create, it creates itself, and there is nothing outside. So the universe-itself is absolutely *Negating*, Not-being, as well as is absolutely *Creating*, being. Hawking's Not-being isn't an original state of nothingness but *Creating-self*.

Hawking, just like Lao Tzu, accredit the genesis of Universe to Not-being. The newest scientific ideas have an echo coming from old Taoism wisdom. But the difference is obvious. The Not-being of Hawking is the *Creating-self*, which creates the universe; the Not-being of Lao Tzu is the nothingness, from which the universe comes.

Not only Taoism, in Chinese traditional ideas Not-being is always comprehended as an original state of nothingness, never understood as an action. But in occidental traditional ideas Not-being often relates to initiative, always predicates the action of negation. Hegel's idea of not-being is the embodiment of this tradition.

Hegel's negation or Not-being is the impelling principle of nature and spirit. The negation of something

¹Lao Tzu, *Tao Te Ching*, trans.Arthur Waley (Hertfordshire: Wordsworth Editions Limited 1997), chapter42.

²Lao Tzu, *Tao Te Ching*, chapter14.

³Lao Tzu, *Tao Te Ching*, chapter1

⁴Lao Tzu, *Tao Te Ching*, chapter1.

⁵Stephen Hawking and Roger Penrose, *The nature of space and time*, (Princeton: Princeton University Press, 1996), pp: 85.

⁶Stephen Hawking and Roger Penrose, *The nature of space and time*, pp: 79.

⁷Stephen Hawking, *The illustrated a brief history of time*, (New York: Bantam Books 1996), pp: 175.

isn't from outside, but from the one thing inside. In other words, the thing is negated by itself, transcended by itself, and determined within itself. For example the seed of a plant, which contains the real possibility of all that is to exist in the tree – burgeoning, growing, blossoming, fruiting, is directed to self-negation and self-determination. This self-negation negates the potential as a seed, actualizes its possibility, and becomes what it is⁸. Negation forces Nature and Spirit to come into being, to open out their nature. But Negation-self, the culminating no-basis- at same time the culminating basis, is absolute, the power of creation self. Hawking's Not-being is similar to Hegel's Negation-self which isn't the nothingness but the creation.

The Universe in a Nutshell

Tao of Lao Tzu has double meaning, law of nature and origin of universe. Tao not only creates the universe but also determines the principles to which everything's movement must keep. The meaning of Dao is rather similar to the genesis theory of modern cosmology. Cosmogonists generally acknowledge that our today's universe evolve from a *seed*. The *seed* of our universe, holding the genic atlas of the universe, not only is the origin of universe but also determines the future of universe. It is a tradition of occident thinking to analogy cosmos as life, for example Hawking's quantum cosmology.

Hawking's quantum cosmology opens out that the universe is the existence of possibility which can birth and die. At the beginning of real time the universe is similar to a *nutshell*, the seed of universe which hold all information of The Origin and Fate of universe⁹. In other words the universe is similar to life. In fact the *nutshell* of universe is the seed of universe *life* which determines the history of our universe, including human being, the stars, galaxies and clusters of galaxies inside it. Hawking regards the universe as a harmonious whole like life. He knows universe in virtue of character of life.

In fact scientists never stop to personify universe not only Hawking. They always like to regard our universe as having immanent life or at least being capable of nourishing and gestating life. It is certain that the universe is endowed with character of life in science

⁸GWF Hegel, *Hegel's Philosophy of Nature*, trans. A.V. Miller (Oxford: Oxford University Press 2004), pp: 6.

⁹Stephen Hawking, *The universe in a nutshell*, (New York: Bantam Books 2001), chapter 3.

no matter the theory of Hawking's *Nutshell* will be verified or unverified.

Personifying is a thinking way of the *reflection* which means that to understand nature is led by life experience inside ourselves.

Reflection has great significance in occident ideal tradition. The essential meaning of *Reflection* is that external object world is similar to a mirror which can reflect a picture of the nature of human by reversed manner. So human beings must have understand external object world before and then think deeply own nature in reverse if they want to understand themselves. In the same way human beings should be led by their apperception to the life if they want to understand nature whole and life. This is the course of seeking which go in deeper from outside to inside, at same time from inside to outside. *Reflection* need light, the light of reason, which kindles nature and spirit. There are different cognition levels of *Reflection*. Obtaining the knowledge of nature science by *Reflection* just see objects. The highest *Reflection* is obtaining the knowledge of pure reason- philosophical ideas, namely seeing *light*- the light of reason. It is obvious that the reason light unites nature and spirit.

Kant's critique philosophy has clarified the rationality of *Reflection* to scientific cognition. *Beauty* is the free feeling of pleasure inside the heart, and *Purpose* is the action of actualizing aim which can incarnate human will. But the principle of *Beauty* – on which the nature creates everything according to the ideal of simpleness and elegancy, and the principle of *Teleology*- on which nature in general is estimated as a system of ends and life is considered as the intrinsic finality in it, are considered as inherent principles of natural science which are used to understand nature things, especially life and nature whole.

Hegel's *Reflection* is *thought backward*. It means that thinking retrospect from the sense, intuition and presentation to the essence and truth, namely the universal principle. And that the universal is nothing but "the determinations of thought" or "categories" which is attribute to Spirit. So *Reflection* means retrospect to Spirit. The intention of *Reflection* to nature is namely to find Spirit in nature, at same time grasps the nature whole led by the spirituality. Hegel think that "Nature has presented itself as the Idea in the form of otherness."¹⁰"Nature is Spirit estranged from itself"¹¹.

¹⁰Hegel, *Hegel's Philosophy of Nature*, pp: 13.

Thereby the aim to reflect nature is that overcomes the division between Nature and Spirit and assures to Spirit the knowledge of its essence in Nature. The essence of Spirit is determining itself. In nature only life is self-activity, self-determination and self-preservation. The seed of a life contains the potential possibility of all that is to exist in the life. The end of a life's activity is to accomplish and exhibit all possibilities inside the seed and to return into itself in higher level. In addition Nature is an immanent living whole. So Spirit can find its own essential model in nature which are life and nature whole. Moreover Nature breaks the mask of estranged Spirit and becomes Idea by *begreifendes Erkennen*.

It is obvious that the way of *reflection* or *Personifying* has fountainhead in tradition of occident thinking.

Universe and Wisdom Life determine one Another

No doubt, *Unity of heaven and human* is the core idea of Chinese old wisdom, which is the harmonious state of human with nature. Taoism is not exception as well. Taoism's heaven is the *heaven* of nature. *Unity of heaven and human* implies that human is determined by nature. Lao Tzu has said "The ways of earth, by those of heaven. The ways of heaven by those of Tao, and the ways of Tao by the *Self-so*"¹². Tao is the way of nature which is not only the *Self-so* but also the *heaven and human*.

The anthropic principle in Hawking's *quantum cosmology* contains the idea of *Unity of nature and human*. It does not mean *human is determined by nature*, but *human and nature determine one Another*. The core of Hawking's *quantum cosmology* is the wave function of the universe. Hawking explains the idea of this function as follow:¹³ Universe hold all possible histories. Our universe is the best possible of all. We, as a wisdom life, have chosen *our universe* by the existence of our own. It is obvious that Wisdom life and Universe determine one Another.

The anthropic principle can be interpreted as such: Why the universe we observe is such? At least the part reason is our existence. Many scientists doubt the rationality of this principle in scientific cosmology,

although in fact it has become the presupposition in modern cosmology.

Certainly it is difficult to regard this principle as a scientific law. Generally speaking a scientific law must satisfy a special structure of causality; the concepts of it should have direct or indirect measurable definition; so it is empirically testable. Obviously *The anthropic principle* doesn't satisfy these conditions as a scientific principle. Firstly its structure is a *argue in a circle* Human and Universe determine one another; cause is namely result and result is namely cause. This is a speculative structure of philosophy. Secondly the concept of the universe or nature whole used to be considered for metaphysics or religion.

We attempt to explain the rationality of *The anthropic principle* in modern cosmology according to the idea of *immanent teleology* in the dialectic reason tradition.

The idea of *Immanent teleology* can trace back to old Greece. It regard nature and humane as unities whole and its immanent aim points to human spirit. Modern times Kant renewed this idea at epistemic level. Kant regards the whole of nature as a vast system of intrinsic end. By investigating the position of man on nature and his connection with all other natural he believes that human is the intrinsic end of nature, particularly human happiness and culture is an ultimate end of nature, and the absolute unconditional being - human freedom will and moral agent is the final end of nature.

Moreover Kant has explained the status, function and rationality of the principle of teleology as an inherent principle of natural science. The principle of teleology is only of a principle of the reflective, not of the determinant when it is applied to natural science. We can't expect to get any particular laws of nature by the idea of ends as principle, but only intent to rationally conceive some objects which can't be explained only by pure understanding causality, such as life and nature whole.

The nature of Hegel is, in itself, a living Whole. The final end of nature evolvment as a whole is to give itself an existence as Spirit, which are the truth and the final goal of Nature and the genuine actuality of the Idea¹⁴.

¹¹Hegel, Hegel's Philosophy of Nature, pp: 14 .

¹²Lao Tzu, Tao Te Ching, chapter 25.

¹³Stephen Hawking and Roger Penrose, The nature of space and time, chapter 5.

¹⁴Hegel, Hegel's Philosophy of Nature, pp: 24 .

Nature could open out its inner being, Only it break the crust of its not-Spirit. Spirit and Nature, like Adam and Eve, have the same inner being. They must unite.

One another and determine one another. *The anthropic principle* doesn't satisfy the needs of nature science to its principles. But we may consider that it is reasonable to apply this principle in nature science in virtue of the idea of *Immanent teleology*. In making an investigation on nature whole this principle isn't of the determinant, only of the reflective. It can't give particular knowledge of cosmology which can be empirically testable, but give us the Ideal of unity of universe and man. Ideal belongs to reason, and usually is applied to the field of *freedom*. But it is also applied to the field of *nature* with perfect justice for helping nature science to understand those things that we are unable to conceive only by causality otherwise than by adopting Ideal. So *The anthropic principle*, as a principle of the reflective, is entitled to hold a place in modern cosmography.

Of course *The anthropic principle* don't definitely express the idea that human is the intrinsic end of nature, which is different with the principle of teleology. It just says that universe has many possible histories by the forecast of quantum cosmology, and *our universe* we have observed is just one of them. It is the existence of human to choose *our universe*, which adapt to human survival best of all. In other words *our universe* looks warm and green just because it is human being to look. Certainly we can't deny other possible universes in theory. But they haven't any significant for wisdom life. Universe show its inexhaustible essence for none but human. Obviously *The anthropic principle* expresses potentially human is the end.

The anthropic principle has chosen *our universe* in all possible universes according to the being and looking of human and shown the ideal of unity of universe and human. They are the same in basic though although *The anthropic principle* with *Immanent teleology* can't be simply equal. The question, why is the universe just like we observe, exists only in the meaning of the being and the cognition of human. Or else it doesn't exist at all because there are not intelligent beings who can ask it. From this point of view, we may say that it is human existence, cognition, even spirit and freedom which *our universe* create, evolve and open its essence toward.

Brief Summary

Unity of heaven and human is the venerable wisdom in china. *Unity of nature and spirit* is the age long ideal in occident. They hold common topic – harmoniousness

and unity of human and nature. The sameness of them is obvious, but the differences of them are tremendous also.

First, *Unity of heaven and human* in Taoism means human is determined by nature. As Lao Tzu says: "The ways of earth, by those of heaven. The ways of heaven by those of Tao, and the ways of Tao by the Self-so."¹⁵ *Unity of nature and spirit* in occident means human and nature determine one Another. Man not only is the being of nature but also the being of spirit. Man holds reason which is the ability to acquire the knowledge of nature; Nature not only is the summation of everything but also the essence and inbeing of the world. Human and Nature create one Another. This is the progress of investigating nature outside as well as opening out human spirit inside.

Taoism advocates nature and advocates the principles of nature.

Usually nature is the sum of sun, moon, stars, mountains and rivers, animals and plants. But in Lao Tzu, *Tao Te Ching*, "natural" is an adjective, which means "this is how you are," "naturally," "as it is," and "is what it is." Nature is right there, the sun and moon through the sky, Rivers flow through the earth, flowers bloom and fall, the clouds roll and stretch, and the changes are endless. So why is nature so? There is no reason, because "nature" as nature is not a "what", we can only "manifest" nature by describing it.

"Naturalness" as the fundamental principle of Taoism appears as "creating." "Tao gave birth to the One; the One gave birth successively to two things, three things, up to ten thousand"¹⁶. "For though all creatures under heaven are the products of Being, Being itself is born of no-Being"¹⁷, The principle of all things in heaven and earth is to create, Nature do everything with "inaction".

The philosophical tradition of the West begins with the philosophy of nature, and when Thales says, "Water is the origin of all things, it opens the philosophy of the West as well as the history of science. The water here is no longer the sentimental thing, but the basis and reason for everything's existence, which is already the philosophical "water ", for philosophy is the inquiry of the highest universality. Starting with Thales, ancient Greece philosophers always carried out the understanding of

¹⁵Lao Tzu, *Tao Te Ching*, chapter 25.

¹⁶Lao Tzu, *Tao Te Ching*, trans. Arthur Waley (Hertfordshire: Wordsworth Editions Limited 1997), chapter 42.

¹⁷Lao Tzu, *Tao Te Ching*, chapter 1.

nature and the questioning of nature to the questioning of "essence" and "origin". There are two meanings of origin, one is the power to create all things, the other is the principle and basis that all things follow.

So when the ancient Greek philosophers discussed "nature", they were not discussing natural objects or the natural world, but discussing the nature of what and the power of creation, and what general principles to follow. Aristotle, for example, specifically discussed the meaning of the word "nature" in "metaphysics", all of which refer to the essence of things, nature, which is the intrinsic basis of the "nature" of natural things. In ancient Greece, the concept of "nature" had a hierarchical differentiation. The sum of the natural things, the sun, the moon and the stars, the mountains and rivers, the plants and animals, is the nature that is given, the nature that is created; and the nature, the essence, is the nature that creates nature, which is the higher level of nature. This differentiation extends to the Middle Ages. In Latin, the word "nature" was divided into two, one was "created nature" *natura naturata* and the other was "created nature" *natura naturans*. The former is passive, the latter is active. But that active nature is higher. His name can be called God.

"Nature" means essence and basis, and the activity of exploring nature and basis is what we call science and philosophy today. Natural science questions the basis of finite things in nature; philosophy questions the relationship between nature as a whole and the human spirit and God, and it is the final basis of nature and spirit, which is often pure spiritual, such as final basis is often purely spiritual. Aristotle's "form", Plato's "idea", "God", Hegel's "absolute spirit" and Kant's "pure reason". Modern science, such as Hawking's theory of quantum cosmology, uses a whole set of scientific theories to explain how the universe was created and originated. It is a picture of the nature of cosmos, a picture of the universe created by scientific reason, not a visual universe presented directly in the tradition of the West, the relationship between nature and spirit is mutually stipulated, then the ultimate stipulation is spirit.

Secondly, the *Unity of heaven and human* of Taoism is the direct unity - an original state of intuition and simplicity, which demands that human become a part of nature. This idea has arrived at the tiptop level as soon as it was founded and changed never. Heaven with human have never separated thousands of years.

But the idea of *Unity of nature and spirit* in occident has come through an endless course of uniting, separating, tending towards unity. Hegel ever compares this course to the Fall of Man: When Adam and Eve, the

first human beings, live in Eden human Spirit is in "*primal state of innocence*, where Spirit is identical with Nature and the spiritual eye is placed directly in the centre of Nature."¹⁸This unity is a natural unity. "A natural unity of thought and intuition is that of the child and the animal, and this can at the most be called feeling, not spirituality."¹⁹ "but the very essence of spirit implies the absorption of this immediate condition in something higher. The spiritual is distinguished from the natural, and more especially from the animal, life, in the circumstance that it does not continue a mere stream of tendency, but sunders itself to self-realization"²⁰. Man eats of the fruit of knowledge tempted by the serpent, and then participates the knowledge of good and evil, participates the likeness to God, knows the difference of spirit and nature. But this awakened consciousness is "the fall of man from the eternal divine unity"²¹. It broke the unity of nature and spirit down. Then the road of human life immediately became infinite hard because "this position of several life has in its turn to be suppressed, and the spirit has by its own act to win its way to concord again. The final concord then is spiritual."²² By searching knowledge hardly the spirit returns to itself and realize the unity with nature again. "the second harmony must spring from the labour and culture of the spirit."²³ Obviously in the occident tradition *Unity of nature and spirit* is the aim not the beginning, is the created not the direct. "But man must have eaten of the tree of the knowledge of good and evil and must have gone through the labour and activity of though in order to become what he is, having overcome this separation between himself and Nature"²⁴. So we should not only see the exterior resemblance but also pay attention to the intrinsic difference when want to explain the new significance of Taoism to modern science by elucidating the analogy between the newest scientific ideas such as Hawking's cosmology with Chinese Taoist school. The origin of science is occident. Hawking's quantum cosmology as modern science may transcend its idealistic plight helped by occidental philosophic tradition.

¹⁸ Hegel, Hegel's Philosophy of Nature, pp: 9

¹⁹ Hegel, Hegel's Philosophy of Nature, pp: 9

²⁰GWF Hegel, The Logic of Hegel, trans. William Wallace (Oxford: Oxford University Press 1892), pp: 54

²¹Hegel, Hegel's Philosophy of Nature, pp: 8

²²Hegel, The Logic of Hegel, pp: 54

²³Hegel, The Logic of Hegel, pp: 55.

²⁴Hegel, Hegel's Philosophy of Nature, pp: 9.

Science has been from strength to strength and inclined to technology increasingly since 20th century. The limitless outspread of scientific way has begun to hurt human heart. The embodiment of it was the counterwork between science with humanity in the philosophic thought more than 100 years. We seem to have forgotten that simple and nice ideal: the truth of nature and the truth of human are identical essentially. Science is not only craft but also wisdom, which is the core of reason spirit.

So, we think that the new significances of *Unity of heaven and human* to modern science is not the exterior similarity between though, but that the old orient wisdom enlighten us on deeply thinking the value of *Unity of nature and spirit* to modern science, which will be the new. Jumping-off to the idea of modern science.

