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On Conservation Laws for an Open System Based on BCM

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Abstract

In order to overcome the various paradoxes existed in the Big-Bang Cosmological Model (BBCM), a novel Buddhist Cosmological Model (BCM) was proposed. Through a comparison between BCM and BBCM, it is found that BCM is conceptually clear and logically consistent and it can explain many paradoxes encountered by BBCM. It is well-known that the laws of conservation play a very important role in modern sciences. However, most of the laws are derived based on an unrealistic assumption of the existence of a closed system or an isolated system and only considering the exchange of energy and matter. In BCM, it is explicitly pointed out that all systems are open in nature and there exists dark matter, dark energy and information exchange in addition to the traditional energy and matter exchange at the system boundary. The main purpose of this paper is to address the issue how to treat the conservation laws for an open system.

Keywords: The Big-Bang Cosmological Model (BBCM); The Buddhist Cosmological Model (BCM); Open System; Conservation; Matter; Dark Matter; Energy; Mind; Information

Introduction

Following Karl Popper's famous opinion, "All science is cosmology, I believe", cosmology is the foundation of all other sciences. Cosmology is intrinsically linked with mythology and religion as a quasi-rational elaboration of the former. Behind each cosmological model, it is the philosophical belief of the proposers. It is well-known that the currently most prevailing cosmological model, the Big-Bang Cosmological model (BBCM), is based on materialism and with this philosophical monism, many paradoxes can be found [1]. From my point of view, the most difficult problem for a materialist belief should be the "creator problem" [2]. How was the first matter created and where did forces come from for creating this matter? This problem also exists in the modern string theory such as what are the strings in the universe and who makes them vibrate? [3]. As a matter of fact, since the discovery of Einstein's famous equation, $E=mC^2$, it has already been proved that the fundamental assumption made in materialism is wrong since matter can be transformed into energy. Schramm [4] has pointed out that very few physical theories are in such a paradoxical situation as Big-Bang cosmology which is completely based on materialism. In this monism, there are no clear definitions of matter and consciousness. In order to explain the redshift phenomenon observed, concepts such as dark matter and dark energy had to be introduced [5], but we are still unclear what they are after many decades' research [6,7].

In order to overcome these paradoxes, the present author has proposed a novel cosmological model based on Buddhist philosophy (Buddhist Cosmological Model, BCM) [8] and a brief comparison was made between BCM and BBCM [9]. From his judgement, it seems that BCM is conceptually clear and logically consistent and it can explain many phenomena which belongs to the frontier problems of modern sciences. BCM has the potential that all the paradoxes encountered by BBCM can be overcome. In another paper [10], the author discussed the issue how to apply scientific criteria to assess whether BCM is a scientific theory or a pseudoscience.

For that purpose, the present author emphasized the following points to act as a basis for the assessment and he is welcome others to critically examine the BCM.

a) Science is a man-made language developed for communicating and understanding the observed natural phenomena among human beings.

b) Every scientific theory has at least three components: axioms, laws and natural phenomena. Axioms are fundamental assumptions called hypotheses. Hypotheses reflect the proposers' philosophical belief. So, every scientific theory is stood on the foundation of a philosophy [11,12].

c) The laws can be derived from the logical deduction from the axioms or from the logical induction from the natural phenomena.

d) Scientific tool can only prove the falsehood but cannot prove the axiom to be always true.

e) Karl Popper's falsification can be selected as a criterion of demarcation to draw a sharp line between those theories that are scientific and those that are unscientific [13].

However, in different from his opinion that there exist some non-falsifiable theories, I declare that every theory is falsifiable. For example, although one may not be able to find a counter example to falsify hypotheses of a theory, he may be able to derive one paradox from this theory if this theory is unscientific. Today I have not found the counter example does not mean tomorrow I will not be able to find. That is the nature of science. Thus, my criterion of demarcation to draw a sharp line between those theories that are scientific and those that are unscientific is dynamic. If our human beings have not falsified the hypotheses of a theory, it is still a scientific theory; otherwise if we have found a counter example or a paradox of a theory, it is unscientific. But if the application range is refined to the scope where the counter example or the paradox is removed, it is still a scientific theory

a) So, every axiom and law used in a scientific theory is only of relative or temporary correctness and it should not be regarded as a truth if we define the truth to be a universal law. If someone takes an axiom or a law to be a truth, it is his belief rather than the scientific evidence. The attitude itself is not very scientific since scientific spirit encourages people to question every axiom or law. Only when I could not find any counter examples to an axiom or a law, should I accept this axiom or law. That is the scientific attitude.

b) In general, accuracy and correctness are always a contradiction. For the given information, the more accurate the less correct. The main task of establishing a scientific theory is to maximize the accuracy for the given information under the condition of correctness. If it is incorrect, the accuracy is meaningless.

In modern sciences, the laws of conservation such as the energy, matter and momentum play a very important role. However, most of the laws are derived based on an unrealistic assumption of the existence of a closed system or an isolated system and only considering the exchange of energy and matter. In BCM, it is explicitly pointed out that none such an ideal system is available in the universe, there also exists dark matter and dark energy. We also know the fact that information will affect the behavior of a human being. Thus, for an open system, there exist exchanges of information, dark matter and dark energy in addition to the traditional energy and matter at the boundary. The main purpose of this paper is to address the issue how to treat the conservation laws for an open system. In section 2, I will make a brief summary of the BCM and in section 3, I will address why the system is open. In section 4, how to use the various conservation laws for an open system is discussed in detail. Finally, I will make a summary and draw some conclusions.

Brief Summary of BCM

The Buddhist Cosmological Model (BCM) is based on the following three hypotheses.

a) Hypotheses 1: The Universe is of infinite nature both in time and space. It can be divided into infinite number of worlds in space. World is of finite nature both in time and space. Each world is cyclically operated according to the process of formation, the steady state, deterioration and explosion to emptiness.

b) Hypotheses 2: The essence of the universe is energy. There are two types of energy, material energy and life energy. Life energy is the source of all forces in the universe and it is responsible for all the changes and movements observed by our human beings. Life energy defined as mind has the capability to accumulate the material energy into matter and to decompose matter into material energy. An individual life is formed if life energy is combined with matter (body). Each life is reincarnated in the universe from birth to death.

c) Hypotheses 3: Everything in the world and each individual life is operated according to the Causal-Effect law.

In this model, the Universe is assumed to be of infinite nature both in space and time and thus it will always be uncertain to human beings. However, no matter how advanced our telescope is, the space we can observe will always be of finite nature and it can only be defined as a world. The concept of the world is similar as the concept of the system. It can be divided into many (sub) systems. The relationship between Universe and world can be expressed by the following equation:

$$Universe = \sum_{i=1}^{\infty} World_i \quad (1)$$

Therefore, BCM can cover the infinite Universe model [14] and the many-worlds model [15]. Since each world will be operated cyclically according to the process of formation, the steady state, deterioration and explosion to emptiness, basically BCM can also cover the cyclic universe model [16]. In BCM, the Big Bang is the origin of the world but not the universe. Since we can only observe the world we are living in this cycle, therefore, the time is of finite nature.

Das assumed the entire universe is filled with two objects - root material and root cause (the soul). Every material object is created by a soul using this root material. Similarly, every action or cause is also created out of this root cause. This root cause is the soul [17]. In BCM, we interpret dark energy as the mind (equivalent to his soul which is of more material nature) and it is regarded as the life energy while our traditional concept of energy is regarded as the material energy (his root material). It is the author's belief that the root cause must be defined in the energy level and should not

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be in the material level. If in the material level, the "creator paradox" cannot be avoided. For energy, there is no time, space, volume or other measurable properties. Energy cannot be destroyed and thus it follows the conservation law in the Universe. Mind has the capability to accumulate the material energy into matter and to decompose any matter into material energy in a world. The formation of a world and the destroy of a world is due to the functions of mind. This can explain the origin of the world.

Matter is defined to have volume and mass. Mass could be static or dynamic. Matter has two types; one is what we can feel and the other is what we cannot feel (corresponding to the dark matter defined in modern physics). By adopting this hypothesis, the origin of matter is explained, and all matter are created by mind by accumulating the material energy in a world and the mind is also able to decompose any matter into material energy. Therefore, there are no basic elements in BCM. This may provide the physical explanation to string theory [18]. String theory intends to provide a unified description of gravity and particle physics that describes all fundamental forces and forms of matter.

In BCM, life is defined as a body with mind and a lifeless object is defined as a body only. Since mind cannot be created by human beings, so robots cannot have mind which is the essence of a life and thus robots will never be lives. Consciousnesses are functions of a life to feel the external world and internal body and according to Buddhism [19], the human's consciousnesses can be divided into 8 types, they are consciousnesses at eyes, ears, nose, tongue, body and brain, the manas consciousness, and finally the alaya consciousness. Only the alaya consciousness will continue to exist after dying and it is the source of life forces and it stores all the karmas in the previous life history. That is why this alaya consciousness is defined as mind in BCM. When one is dying, the consciousnesses at eyes, ears, nose, tongue, body and brain will be lost. The function of the seventh consciousness is the bridge between the former six consciousnesses with the mind. The dying process is a process of the separation of the mind from the body. So, mind is the energy while other seven consciousnesses are related to the body. In BCM, both plants and animals also have mind and some types of consciousnesses but may not have as many as human beings.

There are three types of life in the universe, the mind only, the mind with an insensible body (also dark matter to our human being) and the mind with a sensible body (being animals and human beings) and these three types of lives can also be divided into six categories according to their happiness, Heaven, Asura, Human being, Animal, Ghost, Hell [8]. Only human beings and animals are with a sensible body by our human beings. Non-existence of other types of lives is also a belief or an over-claim rather than a scientific proof. Lives with only mind exists in the Heaven, they are the highest level of life in the universe while the lives in the Hell is the lowest level in the universe. So according to this BCM, human beings are not the most intelligent creatures in the universe but in the middle level. All the matter used by other four types of lives and together with their bodies belong to dark matter.

It is emphasized in BCM that since we can only observe the world we are living, so every theory should only be established to system problems in the world rather than those in the universe. Since world has boundary and finite space, each cycle is of finite time, then we take the belief that world is operated with rules and our human beings can reveal these rules. In terms of the debate between Einstein and Bohr [20], the present author concluded that this controversy was created by Bohr's over claim [21]. Philosophically speaking, there is no need to make the claims that

a) there is no rule in the micro world operation and

b) there exists irreducible uncertainty or objective uncertainty. If hidden variables related to the mind forces are included, then classical statistical mechanics can also explain the quantum phenomena [22].

Therefore, Heisenberg's uncertainty principle [23,24] is only appropriate to the concept of Universe, but not the concept of world. Recently, Das explored several published proofs of uncertainty principle, analyzed the assumptions behind them and pointed out that uncertainty principle is a consequence of Fourier transform (FT) based on infinity assumption [25]. Using logic and mathematics, Barukčić also showed that Heisenberg's uncertainty principle leads to a contradiction and is based on a contradiction. Consequently, Heisenberg's uncertainty principle is refuted in general. Especially, Heisenberg has not refuted the principle of causality [26]. Jaegwon Kim's excellent new book also supports the mental causation law [27].

For any lifeless object from a particle to a star in the world we are living, no matter whether we can see (explicit matter) or not (dark matter), it will experience the cycle of formation, the steady state, deterioration and destroy and for each individual life, no matter whether we can see (human beings and animals) or not (other four types of lives), she/he will be reincarnated within the six types of lives in the universe. Here it must be pointed out that according to the causal-effect law, reincarnation of my live is not confined to this world I am living, but in the whole universe. Even for the mind only life in the Heaven, she/he will also have a life span and can be reincarnated into other five types with a body in the universe, not necessarily in the same world as he/she lived in a previous life. Reincarnation of all lives is a law of nature [28]. So, in this BCM, parents provide only the bodies to their children and not the life. We are very soon reached a stage that we can clone our bodies, but the essence of life does not change, and any lives produced this way should have the same rights as us.

These three hypotheses are adequate to explain all the anomalous phenomena reported in the book [29] such as Near-Death Experience (NDE), Out of Body Experience (OBE), mediumship and children claiming past-life memories etc.

Whether human beings have the so-called parapsychological (psi) phenomena or not is directly related to the functions of the mind. From the founding in 1882 of the Society for Psychical Research, research on psi has used or even developed scientific

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practices, with the aim to "examine without prejudice or prepossession" the nature of these phenomena. The study of purported psi phenomena using the scientific method is defined as a new subject area called Parapsychology. The Parapsychological Association, the professional association of the field, has been an affiliate of the American Association for the Advancement of Sciences (the world's largest general scientific society) since 1969.

Psi typically includes two major areas:

(a) what used to be called extrasensory perception (ESP), and

(b) psychokinesis (PK).

ESP includes purported telepathy (being affected by someone's thoughts or emotions, unmediated by the senses or logical inference, such as guessing more accurately than would be expected by chance who sends you an e-mail unexpectedly), clairvoyance (obtaining information about a distant state of affairs, unmediated by the senses or logical inference, such as in remote viewing (RV) in which someone accurately describes details of a place chosen at random by someone else), precognition/presentiment (being affected by an event taking a place in the future that could not have been foreseen, as in dreaming about planes crashing against tall buildings the night before 9/11), and retrocognition (having noninferable knowledge about a past event). PK refers to putative direct action of mental events (e.g., intention) on physical objects, unmediated by muscular or indirect mechanical activity. There is macro-psychokinesis (or anomalous force), an effect on observable objects such as a table levitating without any apparent mechanical explanation, and micro-psychokinesis (or anomalous perturbation), an effect on small, unobservable events, such as mentally affecting the output of a random number generator that otherwise produces random outputs. Some psi researchers study the possibility of consciousness surviving death, including studies of children who spontaneously report information about a past life to which neither they nor those close to them apparently had access [29]. Both descriptive and experimental approaches can be employed to evaluate psi phenomena. Cardeña carried out a comprehensive integration of current experimental evidence and theories about psi phenomena and concluded that the evidence provided cumulative support for the reality of psi, which cannot be readily explained away by the quality of the studies, fraud, selective reporting, experimental or analytical incompetence, or other frequent criticisms. The evidence for psi is comparable to that for established phenomena in psychology and other disciplines, although there is no consensual understanding of them. The psi capability is a support to our assumption that mind has the capability to accumulate energy into matter and to decompose matter into energy.

Definitions of systems and their characteristics

It is well-known that traditionally we have classified a thermodynamic system of three types, a closed system, an isolated system and an open system [30]. A closed system can exchange energy but not matter, with its surroundings. An isolated system cannot exchange any energy and matter with the surroundings, while an open system can exchange energy and matter. With this definition, the dark matter, the dark energy and information which might be important to the system state are not included. Therefore, it may be a great simplification from reality if one uses the assumption of a closed system or an isolated system. As far as I know, most of the laws such as three Newton's laws and three thermodynamic laws are all based on this assumption.

If we define information as the useful messages used for communication among living creatures. It includes data and knowledge and it is neither energy nor matter and it can be transmitted through energy and matter. Then, it is a well-known fact that information could also exert influence on the system behavior. Thus, for an open system it must consider the exchange of energy, mind, matter, dark matter and information at the system boundary shown in Figure 1.

On the use of conservation laws for an open system

In BCM, there never exists any closed or isolated system in a world. Since Universe is infinite, it is meaningless to discuss any nature of Universe, i.e., whether the Universe is a closed system or an isolated system or an open system. Since all the systems our human beings faced should be in a world, no matter how big it is, such as the Milky Way or even larger Galaxy system, it is an open system in nature since we could not prevent the exchange of information, energy and even dark matter at the system boundary. Therefore, the assumption of a closed system or an isolated system is purely mathematical and does not represent the reality. Thus, all the laws derived by employing this assumption should be subjected to the scrutinization to identify their application ranges.

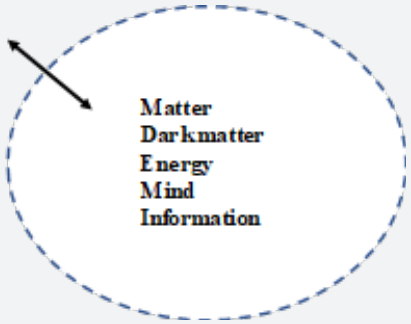

Figure 1: A schematic representation of an open system. The dotted line represents the boundary of the system which can transfer matter, dark matter, energy, mind and information.

In this section, let us discuss the conservation laws for an open system shown in Figure 1. In general, a system consists of energy, matter, dark matter, mind and information, at the boundary there exists exchange for these five quantities. Let us define all the energy provided by mind as the dark energy, represented as E_{dark}. Information will affect the mind to create the dark energy. The use of the conservation laws is mainly related to the four quantities energy, mind, matter and dark matter. Similar as the boundary between science and pseudoscience should be dynamic, the boundary between matter and dark matter should also be dynamic. If we can detect something through the progress of equipment or

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meditation, it is matter; otherwise it is dark matter. However, the boundary between energy and dark energy (life energy or mind) is clear and material energy can never be turned into life energy and vice versa.

In the past, we only considered the change from matter to matter (physical or chemical reactions) or from matter to energy (atomic reaction). Even for these reactions, without the participation of human beings, they are impossible. Human beings contain mind and therefore, E_{dark} is implicitly contributed in these reactions.

Let us consider the first reaction, how mind creates a particle? It is assumed that mind can accumulate the material energy into a particle.

The energy conservation equation can be written as

$$E_{dark} + E_{material} = E_{particle} \qquad (2)$$

where E_{dark} is the internal energy contributed from mind to form the particle, $E_{material}$ is the external material energy in the world consumed to form the particle. $E_{particle}$ is the potential energy stored in the particle? Einstein derived an equation $E_{particle} = mC^2$, where m is the mass of the particle. Whether this equation can be used for any material needs to be re-checked. From a philosophical point of view, same weight of different materials may contain different quantities of potential energy. How to define and calculate this potential energy needs to be further investigated. For a given particle, if it is stable, it will behave as a particle. For a given particle, if it is unstable, only when the mind force to hold the material energy as a particle, it behaves as a particle. If the mind force is released, it will return to the energy state. That mechanism could also explain the wave-particle phenomenon.

Let us consider the second reaction, how mind decomposes a particle into material energy? The energy conservation equation can be written as

$$E_{dark} + E_{particle} = E_{material} \qquad (3)$$

For some particle, a small input of dark energy can induce a large amount of material energy release, this is called atomic reaction and this energy is called nuclear energy. But for most of particles, the consumption of dark energy may be much higher than the material energy release. This kind of materials are certainly not suitable for manufacturing the atomic bombs.

Information can disturb the state of mind and thus influence its output of dark energy. So, exchange of information could also affect the system behavior if the system contains mind.

For the mind to output dark energy, it needs material to be consumed similar as a person needs to be fed by food. One point is that the mind has the potential to consume dark matter if it is properly trained. Mind also has the capability to ask other mind for help. This is called the entanglement of the mind. The speed of mind has no limit and thus if we need to transfer a message at superluminal speed, we can use this property of mind.

For the traditional physical reactions and chemical reactions, if the initial E_{dark} is excluded from the reaction and only considering the later process, then original conservation laws of matter, energy and momentum can still be used. However, one must remember that mind can exert influence on any reactions. In the use of the second thermodynamic law, this problem should be particularly careful. It is speculated that violation of the traditional second thermodynamic law is possible due to the neglect of the contribution from mind [31,32]. If this is considered, the general law of energy conservation still works.

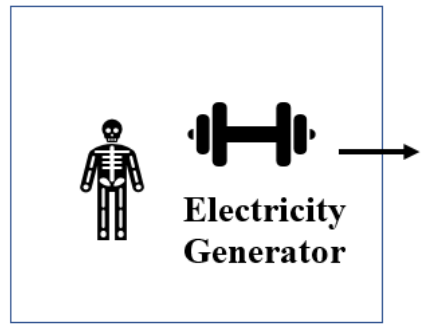

Figure 2: A schematic system to convert man's power into electricity.

In order to explain the functions of mind, let us carry out a thought experiment. Figure 2 shows a manual system to use man's power to generate electricity. Let us compare the energy balance of the four systems.

The four electricity generators are supposed to be the same. A man uses his hand to rotate the handle, the electricity will be generated. System A and System B are a twin with the same height and same weight. Their names are called Smith-A and Smith-B. System C and System D are a pair of the same robots. Their names are called Robot-C and Robot-D. Obviously, Robot-C and Robot-D need to set up a battery inside their bodies in order to work while Smith-A and Smith-B do not need to set up a battery. So, one function of mind is as similar as a battery to drive the body to move. As Robot-C and Robot-D's movements will consume the electricity from the batteries. Let us define $\eta = E_g / E_b$, where E_g is the electricity generated by the system and E_b is the electricity consumed from the battery. It is well-known that the efficiency η will always be less than 1. Although Robot-C and Robot-D together with their two generators are supposedly made in the same way, due to the participation of the designers and manufacturers, small difference could occur and this gives that the efficiencies for system C and system D will be different, i.e., $\eta_C \neq \eta_D$, but the difference will not be expected to be very large.

However, for systems A and B, Smith-A and Smith-B will generate electricity by the combustion of their food eaten with the air they breathe. Assuming we can measure how much air they breathe and how many weights they lose. By equating this matter as energy using similar functions such as $E = \lambda mC^2$, m is the total mass of the weight loss of the body together with the weight of

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the breathed air, λ is the combustion efficiency of a person. Let us define $\eta = E_g / E_b$, where E_g is the electricity generated by the system and E_{eq} is the equivalent energy consumed by a person by the combustion of their food eaten with the air they breathe. The efficiencies η_A and η_B could be very different. Therefore, mind is not only a battery, but it is an engine which can combust food and air. Now air is unlimited in the universe, but food is limited. For the same amount of electricity generated, the less food is consumed, it is better. In that case, if a person is trained to survive just relying on breathing air, his performance is certainly the best. In Chinese Daoism and Indian Buddhism, there are many reports that some persons can survive a long time without drinking water and eating food. It cannot say they violate the energy conservation law but can only speculate that they may combust dark matter with air. So, the second function of mind is that it is a special engine which can combust matter with air and by training can have the potential to combust dark matter with air. Since both dark matter and air is infinity in a world which is a part of a Universe and is open to the Universe, this system can also be regarded as a renewable energy.

The third function is that mind has the capability of communication and thus can obtain the support from other lives which have the mind. This is defined as the entanglement of mind. For example, Smith-A can ask a friend M to rotate the electricity generator and he takes a rest. If the friend is insensible by ordinary human beings, then it is hard to detect using traditional means what happened. In Buddhist sutras, there are many reports that someone was fed by persons from the Heaven. Of course, such kind of things need to be strictly scrutinized by future scientific researchers, but in BCM, this is possible if such a phenomenon is really observed. Currently, quantum entanglement is very popular and from BCM, it is not the entanglement of particles but the mind behind the formation of these particles. Only mind has the property of entanglement but not the lifeless objects. Due to the entanglement property, the capability of mind will greatly be affected by their mood which is the influence from other lives and even environment created by other lives. Obviously, the properties of mind need many further researches and currently the mind-body relation is also one of the most challenging problem [29].

The fourth function is that mind is always global but other six or seven consciousnesses may be local due to the fact they are functions of body and organs. In BCM, uncertainty principle can only be applied to the concept of Universe which of infinite nature and uncertainty exists due to the lack of information for a world and thus it can always be reduced to the level as required in accumulating more information. The world will always operate with the causal-effect law and this law can be revealed by human beings through finding out more hidden variables. Bell's exclusion of the hidden variables is due to the assumption of locality and all the hidden variables related to mind is global [33-35].

Summary and Conclusions

The cosmological model is very important, and it is the basis for other sciences. The currently most prevailing cosmological model for the observable universe, the BBCM, still exists many un-answered questions. In order to overcome these problems, a novel cosmological model based on Buddhist philosophy (BCM) was proposed by the present author and it seems conceptually clear and logically consistent and it can explain many phenomena which belongs to the frontier problems of modern sciences [8,9]. In a previous paper, how to apply scientific criteria to assess whether BCM is scientific or unscientific has been discussed [10]. The conservation laws are very important for a lot of modern science subjects; however, previous derivations of the conservation laws are more or the less all based on the assumption for a closed system or an isolated system. This assumption is unrealistic from the BCM point of view and according to BCM, only the largest system, the Universe, can use this assumption and for all the sub-systems we can observe, they are finite both in space and time and they are open in nature since we cannot build a wall for preventing the exchange of energy, dark matter and dark energy. So, in this paper the related problems about the conservations laws for an open system are discussed. Through these discussions, the following conclusions can be drawn:

a) According to BCM, only Universe is of infinite nature and any problems related to the system of Universe is of Irreducible uncertainty.

b) The space our human beings can observe can only be called a world which is a sub-system of the Universe. The worlds are of finite nature both in time and space. All things in a world abide the causal-effect law. This law can be revealed by human beings through continuous scientific researches. Uncertainty may always exist for a large and complex system due to the lack of knowledge and observed data, but these uncertainties are reducible.

c) Any system in a world is an open system. It can exchange matter, energy, dark matter, dark energy and information. When considering the conservation laws, one needs to consider the exchanges of these five quantities at the boundary. All the existing laws derived by ignoring other three quantities can only be regarded as an approximation and cannot be regarded as universal laws.

d) Dark energy is interpreted as the life energy and thus it is called mind. Mind has the capability to accumulate the material energy into matter and to decompose any matter into material energy in a world. The formation of a world and the destroy of a world is due to the functions of mind. How to train mind to consume dark matter to generate energy is a very important direction for the future research.

e) Mind is a global parameter and it has the function of entanglement. It is possible to realize the superluminal communication and transportation using the entanglement property of mind. Due to this property, the capability of mind will be greatly affected by their mood which is the influence from other lives and even environment created by other lives. Obviously, the properties of mind need many further researches

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and currently the mind-body relation is still one of the most challenging problem.

f) Therefore, BCM could overcome many barriers of modern sciences and open a new paradigm for scientific thinking.

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