

GENESIS AND BLACK HOLE UNIVERSE: THE FIRST DAY

Prof. PhD. Tianxi ZHANG,

Department of Physics, Chemistry, and Mathematics, Alabama A & M University,
Huntsville, Alabama 35762,
UNITED STATES,
Email: tianxi.zhang@aamu.edu

ABSTRACT

The ancient biblical or Hebrew's cosmology, conventionally developed from the book of Genesis, apparently and severely contradicts with observations of the universe. The book of Genesis about the creation of the universe could not be fully addressed, described, and understood by any universe model developed so far. Recently, the author developed a new cosmological model called black hole universe, which can explain all known observations of the universe and overcome all existing cosmic problems without any hypothetical entities. This study attempts to make an innovative interpretation of Genesis according to the black hole universe model. We aim to examine the origin and development of the universe scientifically, philosophically, and theologically for the truth, beauty, and love of the universe. This paper as Paper-I focuses on the first day from the beginning of creation, Enduing words like Earth, Water, Night, and Day in the book of Genesis with physical implications and meanings, we eliminate all discrepancies between Genesis and observations. The black hole universe model makes Genesis to be understandable, consistent with observations, and support of the model to thoroughly reveal mysteries of the universe. The second through fourth days will be addressed in next papers.

Keywords: Genesis; Cosmology; Black Hole; Universe;

1. INTRODUCTION

1.1. Nature of Cosmology

Cosmology is the study of the universe, including its origin and development [1-3]. The cosmological method should not be only scientific, but also philosophical and theological (Figure 1). The science of cosmology discovers the truths of the universe and explains why the phenomena scientifically occur in the nature. For instances, in 1929, Edwin Hubble discovered the truth that light from galaxies was all shifted towards the red end and he then interpreted the phenomenon as the expansion of the universe [4]. Seven decades later, Adam Riess, Saul Perlmutter, and their colleagues discovered the truth that distant type-Ia supernovae were all fainter than expected luminosity from the redshift of their light and they further explained the phenomenon as the acceleration of the universe, driven by the mysterious dark energy [5, 6]. Recently, the author developed a new simple redshift-distance relation from Mach's principle and light relativity [7], that not only perfectly explained the redshift and distance measurement of type-Ia supernovae but also inherently derived Hubble's law, so that did neither support acceleration nor expansion of the universe, which holds up Einstein's static universe. He also corrected the approximate luminosity distance-redshift

relation, conventionally used to explain the supernova measurement, with an elegant redshift factor that can also rule out the acceleration of the universe and hence removes the need of dark energy [8].

The philosophy of cosmology reveals the beauty of the universe, including the conceptual foundations of cosmology and the philosophical contemplation of the universe as a totality [9]. Big questions to the universe are usually the philosophical questions of cosmology such as the fine-tuning of the universe, the arrow of the time, the origin of the universe, and so on. Philosophically, the universe must be in all aspects characterized as beauty, simplicity, and completeness. An ugly, complicated, and incomplete stuff cannot be a work done by God. The theology of cosmology reveals the love of the universe, including the initial creation and origin of the universe and lives, and shows God's spirit, power, and love to the entire universe and all lives created by him including our earthly beings. Therefore, cosmology is a branch of study to find scientifically the fundamental truths of the universe, to explore philosophically the complete beauty of the universe, and to uncover theologically the great love of the universe.

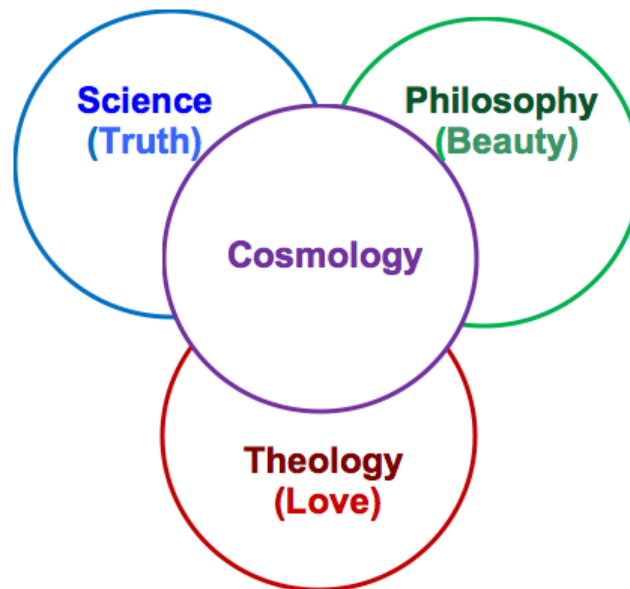
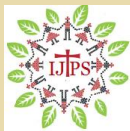


Fig. 1: Cosmology is the study of the universe, combining science, philosophy, and theology. The science of cosmology explores the fundamental truths of the universe; the philosophy of cosmology reveals the complete beauty of the universe; and the theology of cosmology shows the great love of the universe

1.2. History of Cosmology

The history of cosmology can be traced back to some thousand years BC, e.g. the 3000 BC's Babylonian cosmology with the heavens and the earth being equal and joined as a whole without the geocentric worldview [10], the 1700 BC's Hindu cosmology for the universe to be cyclically created and destroyed with the multiverse concept [11], the ancient Hebrew or biblical cosmology of a flat earth at the middle connecting via gates with a hell below and heavens above [12], the 2 AD's Ptolemy geocentric model of the universe that describes our earth to be the center of the universe and all planets including stars and moon to be revolving around the earth [13], and the 1600 AD's Copernicus-Kepler-Newton



heliocentric model of the universe that describes the Sun to be the center of the universe and our earth (also planets and moon) to rotate by its own [14].

The modern cosmologies were developed or grown up on the basis of the ideas of those early cosmologies and the observations of the universe with modern instruments and started their eras especially after Albert Einstein developed his general theory of relativity in 1916 [15], such as Einstein's infinite static cosmology [16], de Sitter's infinite dynamic cosmology [17], and Friedmann-Lemaitre's finite dynamic big bang cosmology [18-19], Zhang's black hole model of the universe with infinite layers [20-21] and so on of many other alternative models. Ancient cosmologies were most mainly philosophical and theological, while modern cosmologies including the Copernican heliocentric model of the universe were more scientific, but here the author prefers to suggest that it should also cross borderlines among science, philosophy, and theology as shown in Figure 1. It should be pointed out that any finite universe model must face critical issues and difficulty on the outside worlds and prehistory of the universe. Any infinite universe model cannot actually scientifically address the origin of the entire universe, but can philosophically describe it as being existed forever beginninglessly and endlessly or theologically describe it as being created by God in the beginning.

However, a consistent understanding of the universe has not yet been developed from these three aspects. Arguments and battles between creationists and scientists have been on-going for many decades and centuries. Nowadays, philosophers almost cannot provide any essential help or action. Convincingly relying on the well-developed modern sciences of the nature and well-developed high-tech observations of the universe, scientists systematically developed the standard big bang cosmological model. The strength of the big bang model includes that it solidly bases on the Einsteinian theory of general relativity to describe the effect of matter on spacetime and the Newtonian cosmological principle to describe matter and radiation to be uniformly (or isotropically and homogeneously) distributed in spacetime. The weakness of the big bang model is that the model strongly relies on an increasing number of hypothetical entities (HEs) in order for it to be capable of explaining the observations of the universe and overcoming the cosmic difficulties [22]. The big bang model of the universe is not yet enough scientific because it includes many HEs that may never be tested or justified such as dark energy and inflation, not yet enough philosophical because it has many uncertain issues that cannot be appropriately solved or answered such as what the outside of the universe is, what the era before the big bang was, where the universe came from, etc., and thus is incomplete or imperfect, and not yet theological at all because it is severely inconsistent or conflicts with the book of Genesis of the bible and thus excludes the creator, God. A big bang of this finite universe does not need God, but for the outside and prehistory, we may still have to think it philosophically or theologically.

1.3. Black Hole Universe

A new cosmological model called black hole universe (BHU) was recently developed on the bases of three fundamentals by the author [20-21] in attempt to model the universe, explain the existing observations, and overcome the cosmic problems and difficulties without relying on a set of HEs [23-24]. The three fundamentals of black hole universe are: (1) Einstein's general theory of relativity (GR) that describes the effect of matter on spacetime, (2) Newton's cosmological principle (CP) of spacetime homogeneity and isotropy in a large scale, and (3) Zhang's newly proposed principle of spacetime black hole equivalence (SBHEP) that suggests that a black hole constructs an individual spacetime and a spacetime

wraps a black hole. In comparison with the currently accepted standard big bang model of the universe (BBU), the black hole universe model uses one extra principle to remove all hypothetical entities (Figure 2).

The black hole universe model does not exist the horizon and flatness problems so that an inflation epoch is not required. Its origin and growth from star-like and supermassive black holes removes the initial big bang singularity and magnetic monopole problems. A black hole is static when it does not accrete or merge with others, otherwise it becomes dynamic, expands, and emits. Gamma ray bursts, X-ray flares from galactic centers, and quasars can be self-consistently explained as emissions of dynamic star-like, massive, and supermassive black holes [25-29]. The entropy of a dynamic black hole obtained from this model is quite lower than that of a static one obtained from the Hawking radiation. Cosmic microwave background radiations are blackbody radiations of the black hole universe, an ideal blackbody [30]. A black hole universe can be static if nothing enters in, expands if it accretes matter, and accelerates if it accretes matter in an increasing rate, so that an explanation of the supernova type-Ia redshift and luminosity distance measurements does not need dark energy [31].

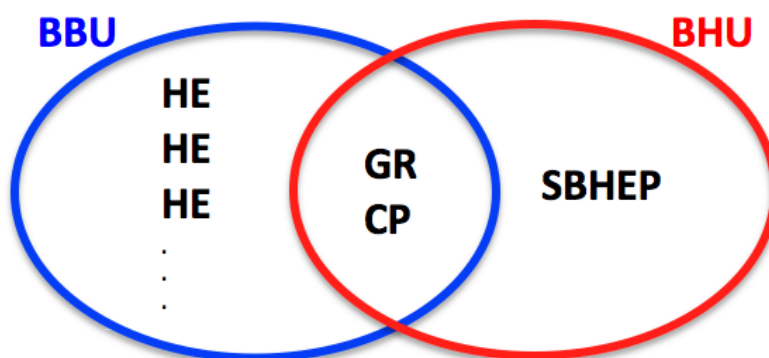


Fig. 2: The comparison of fundamentals between BBU and BHU. The BBU is based on two fundamentals, GR and CP, with innumerable HEs in order for it to explain observations and overcome cosmic problems and difficulties. The BHU is based on three fundamentals: GR, CP and SBHEP, with one more base (i.e. SBHEP). The BHU can also perfectly explain all the existing observations of the universe and meantime overcome the cosmic problems and difficulties in terms of the well-developed physics without needing any other HEs [23-24].

1.4. Motivation and Objective

The ancient biblical or Hebrew's cosmology, conventionally developed from the book of Genesis, apparently and severely contradicts with observations of the universe. The book of Genesis likely appears to describe the universe with a flat earth at the middle connecting via gates with a hell below and heavens above as shown in Figure 3 [12]. The disagreements between observations of the universe and Genesis of the bible are most probably resulted either from the ancient bible writer, who did not appropriately describe God's inspiration for the creation of the universe, or from the later bible translators, who did not precisely translate the book of Genesis from Hebrew to English. There has not yet been any universe scientific model developed so far to be able to fully address, describe, and understand the book of Genesis about the creation of the universe.

The objective of this study is to describe and understand the Genesis of bible, by applying the black hole model of the universe. This paper especially focuses on the first day

of God's work on the creation of the world. The next papers will self-consistently explain God's work on the 2nd through 4th days. We aim at an attempt to develop a cosmological model which is consistent with observations of the universe for revealing the mysteries of the universe and making the consistency between science of cosmology and the book of Genesis in order to provide a new interpretation of Genesis and meanwhile to confirm and support the black hole universe model in terms of Genesis. Through this effort, the black hole universe model will be demonstrated to be scientific because it reveals truths and self-consistently explains observations of the universes, to be philosophical because it is complete and simply answers questions and overcome difficulties without any non-testable hypothetical entities, and to be theological because it is biblical and innovatively interprets the Genesis of the bible.

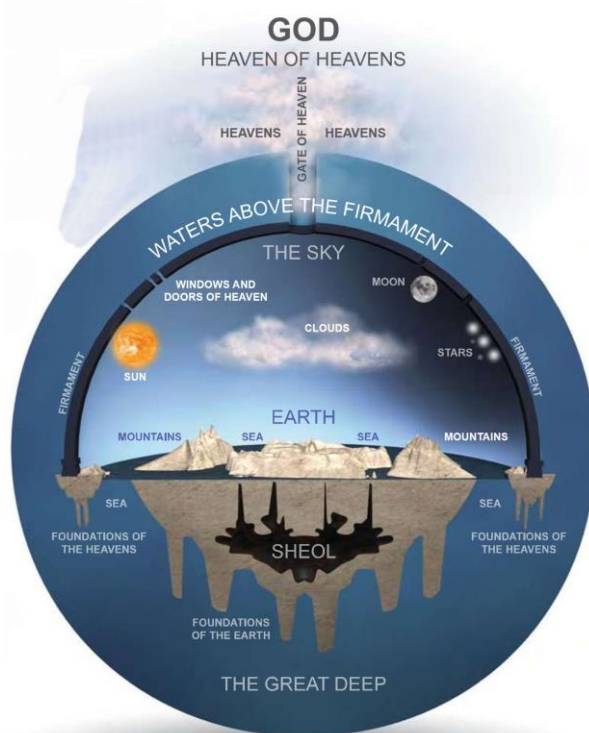


Fig. 3: Jewish/Hebrew/biblical cosmology constructed directly from the current understandings of Genesis of the bible [12] (credit: 1. NIV Faithlife Study Bible, James McGrath, patheos.com; 2. Graphic by Karbel Multimedia, Copyright 2012 Logos Bible Software).

2. GENESIS AND BLACK HOLE UNIVERSE: THE 1ST DAY

In this section, we interpret the book of Genesis according to the black hole universe model. We apply the New International Version (NIV) of the bible [32].

2.1. Creating the Entire Space

The first sentence in the first chapter of Genesis says: *¹In the beginning, God created the heavens and the earth.* Here, the heavens without any doubt should not simply be the skies around the upper atmosphere or the celestial spheres that we can usually see but the worlds of spirit, i.e. the holiest places or paradises, that God, angels, and other heavenly

beings reside or live in. Many other parts in the bible said indeed that the heavens are the dwelling places of God, God's angels, God's saints, and some human spirits at death to go. In contrast or comparison with the heavens (i.e. the words of spirit), the earth here should not simply be the celestial sphere or planet that we are now standing on but the world of matter or the entire space (later on, we will call it as the grand universe) that all the matter and earthly beings including our human beings and other lives exist or live in.

This understanding of the earth as the entire space is further supported by the first part of the second sentence in this chapter of Genesis. Henceforth, the earth means the whole world of matter rather than just our planet. The earth is contrasted with the heavens; and the things earthly are contrasted with the things heavenly. Considering the earth as our planet tinely constrains or shrinks the grandness of God's significant work, super power, and great love on his creation of the entire world of matter or the universe. Since the Hebrews had no proper word for "world" in its wide sense of "universe" [33], the bible writer chose the word "earth" to represent the world of mater or the universe.

^{2a}*The earth was formless and empty, darkness was over the surface of the deep,.* Any object, if it is finite, should have its form no matter whether the form is describable or not. An irregular form is also a form. Thus, the formlessness of the earth strongly implies that the earth is infinite, so that supports the understanding of that the earth is not the finite celestial sphere or planet that we are now standing on but the entire space, which is infinite in size or radius of $R = \infty$. Then, the emptiness of the earth obviously refers to that, in the beginning, the entire space did not contain any matter or was massless (more strongly says energy-less), $M = 0$. That darkness was over the surface of the deep further noted us that the entire space was lightless or more strongly radiation-less with zero degree of the temperature in the absolute scale, $T = 0$. In physics, an object, if has a darkness surface (no emission of light), can be considered as a black hole.

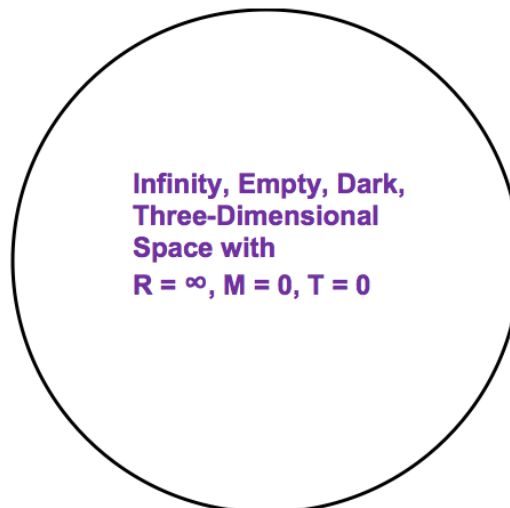


Fig. 4: The infinite, empty, and dark three-dimensional space (or an empty black hole) that God created in the beginning. In the first chapter of the book of Genesis, it is called the earth. Because it is formless and thus infinite, we interpret the earth as the entire universe (i.e. the world of matter) that God created for matter to exist and earthly beings to reside in. In contrast to the earth as the world of matter, the heavens that God created are the worlds of spirit.

Therefore, the first part of the second sentence in the first chapter of Genesis told us that the entire space created by God in the beginning was an empty infinite large dark/black hole, a three-dimensional (3D) dark empty space (see Figure 4). Time, which is a quantity to measure change and motion, could not be started (or say $t = 0$ was kept or remained) because there was no matter and thus no motion and no change. The quantity of space determines positions and measures sizes and an empty space is not yet physical, but purely geometrical. God is a spaceless being and space only opened with his creation of the universe. Therefore, in the beginning, God opened an infinite empty dark geometric space without matter and energy, called the earth in the Genesis of the bible.

2.2. Creating the Matter and Powering It

The second part of this sentence says: ^{2b}and the Spirit of God was hovering over the waters. Here, there is a question obviously: In such an initial empty space, where did these waters come from? Of course, the answer should be that God created/made these waters and filled them into the empty earth (i.e. the entire space). Therefore, after creating/making waters and further filling the waters into the entire space, God let his Spirit be hovering over the waters. Here the waters, obviously, should not be the waters that we are using and drinking everyday, whose molecules are made of two hydrogen and one oxygen atoms (H_2O), but can be understood as God's waters, a type of the initial matter or substance that is super fluidal and neutral. The Greek philosophers believed water to be the original substance and that all things were made from it [34]. The Koran stated that: "From water we have made all things". Everything nowadays we see are all made from this initial matter, God's waters.

The amounts of matter that can fill up the empty infinite large black hole are determined in accordance with the following mass-radius relation,

$$\frac{2GM}{c^2R} = 1, \quad (1)$$

which is the relation between the mass and radius of a black hole according to the Schwarzschild solution of Einstein's general relativity [16, 35]. It is also the relation between the effective mass and radius of the gravitational interaction according to Mach's principle (or conjecture) [36-39] and the relation between the mass and radius of the observable universe according to the observations of the universe. Eq. (1) is the simplest relation between matter and space because the amount of matter is linearly proportional to the scale of space (in God's units, it might be simply just $M = R$). In the recent review of the black hole universe model [24], the author named the Mach-Schwarzschild mass-radius relation (Eq. 1) as the 0th law of black hole universe (or God's law of matter and space).

The matter is uniformly (i.e. homogeneously and isotropically) distributed in the entire space and the density of matter, which is defined as mass M divided by volume V , is thus given by

$$r \circ \frac{M}{V} = \frac{3c^6}{32\rho G^3 M^2} = \frac{3c^2}{8\rho G R^2}, \quad (2)$$

which is infinite small or tends/limits to zero if R or M is infinite large. In Eqs. (1) and (2), the constants G and c are the gravitational constant and the speed of light in the free space, respectively. Newton's cosmological principle, one of three fundamentals of black hole universe, requires the universe or spacetime in a large scale is homogeneous and isotropic. The metric of a finite isotropic and homogeneous spacetime or black hole including our black



hole universe is given by the Friedmann-Lemaitre-Robertson-Walker (FLRW) metric [19, 40-42]

As the Spirit of God was hovering over the waters, God was using his Spirit or power to do work in order for the initial super flowable matter (or the waters) to have energy and to move via the work done by the gravitational interaction (i.e. the interaction between masses), a fundamental force created by God in this era for the nature, followed by the first and second laws of thermodynamics, i.e. the law of energy conservation including heat and the law of entropy (defined as a measure of system's disorder) increase for any isolated system or the entire universe. The rotational or spinning characteristics of all celestial objects including the later formed planets, stars, galaxies, and clusters might be due or come from the initial hovering of God's Spirit and power. With this fundamental force, the mass of an object in the entire space measures the inertia of motion of the object. As Mach's principle stated, the inertia of an object is resulted from the gravitational interaction of the object with the rest of the universe. In this era, the time was started or created by God to measure the change and motion and it always points to the future along the direction of entropy increase. God is a timeless being and time only began with his Spirit to power his created matter and universe.

Therefore, the space and time (shortened as spacetime) of the grand universe that God created was an infinite large black hole with infinite mass and radius, but a constant mass-radius ratio as shown in Eq. (1) and an infinite small mass density as shown in Eq. (2). In other words, the spacetime created by God is equivalent to a physical black hole. Until this point, the universe is darkness that God later called night as seen from the next sentence. The temperature of the grand universe is not absolute zero but still infinitesimal because both the density and pressure of the matter are infinitesimals.

2.3. Creating the Light

³And God said, "Let there be light," and there was light. In physics, light is a type of electromagnetic radiation, composed of varying electric and magnetic fields, which are produced by accelerating electrically charged particles. According to the decreasing order of wavelength or the increasing order of frequency, physicists usually categorize electromagnetic radiation/waves as radio wave, microwave, infrared, visible light, ultraviolet, X-ray, and gamma ray. Oscillating negatively charged electrons and positively charged nuclei including protons may produce radio and microwaves. Thermal motions of electrons may produce infrared. Orbital (i.e. energy level or state) changes of electrons in atoms may emit visible light and ultraviolet. Sudden stops of high-speed electrons on a target can emit X-rays. Nuclei reactions and decays may produce gamma rays. It should be noted that, to God, a light with any frequency is visible, but to human beings, the visible light has a rather narrow range of frequency or wavelength (~ 700 - 400 nm). A dog visualizes infrared light also with its eyes and a bat visualizes microwaves also with its ears.

To have charged particles for emitting light or electromagnetic waves when they accelerate, God first set the free neutrons (n) that are composed of the initial super fluidal matter (i.e. God's waters) to be unstably decaying to protons (p), electrons (e^-), and antineutrinos ($\bar{\nu}_e$) with a mean lifetime of just under fifteen minutes, a quarter of one hour (or one "ke" in Chinese),



This decay is usually called as the β -decay because an electron (or β particle) is emitted. In the particle physics, the β -decay is resulted from the weak interaction, which was



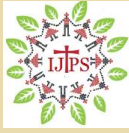
innovatively interpreted as the interaction between electric and color charges within a quark or among quarks by the author recently [43].

This implies that God created the weak force (an extremely short range interaction, $\sim 10^{-18}$ m) in order for neutrons to decay into protons and meantime emit electrons and electron-type antineutrinos. Here, protons are positively charged particles with mass $m_p = 1.67 \times 10^{-27}$ kg and charge $q_p = e$ with $e = 1.6 \times 10^{-19}$ C as the fundamental unit of electric charge. Electrons are negatively charged particles with mass $m_e = 9.1 \times 10^{-31}$ kg and charge $q_e = -e$. Neutrons are neutral particles but with mass slightly greater than protons. Neutrinos are also neutral particles but with very small amount of mass and about the light traveling speed. The mystery of solar neutrino missing is addressed by the oscillations of neutrinos between different flavours or types. The author also addressed neutrino oscillations according to his quark annihilation and pair production model [44]. The entire space (i.e. the grand universe) contains equal amount of positive and negative charges and thus is neutral. For charged particles to accelerate and hence to produce light, God created another fundamental force, the electromagnetic interaction (i.e. the interaction between electric charges). Because the charges that created by God have two types (i.e. positive and negative), the electromagnetic force can be repulsive and attractive. Among one another, like charges repel while unlike charges attract.

Neutrons and protons fuse together via the strong force (i.e. the interaction between color charges) to form elemental nuclei. A Russian chemist, Menchelev, listed all the nuclear elements according to their physical and chemical properties or their number of protons into a table called Periodic Table of elements. So far, the total number of elements that scientists discovered in the nature and formed in labs has been over one hundred and eighteen. Various kinds of nuclei combine with electrons via the electromagnetic force to form various kinds of atoms. Multiple same and different atoms bound together to form chemical molecules of gases, liquids, and solid objects. Particle physics suggests hadrons such as neutrons and protons to be composed of quarks, which carry both electric and color charges and thus participate in the both strong and weak interactions. Leptons such as electrons and neutrinos can participate in weak interaction but not strong interaction. Therefore, when God created light, he created not only electric charges with the electromagnetic force, but also atoms and nuclei with the weak and strong forces.

In the ancient times, the natural world or universe was ever considered to have five elements: space, wind, water, fire, and earth. In the traditional Chinese Yin Yang, five-elements, and eight diagrams theory, the space and wind are replaced by metal and wood. All the natural phenomena are described by the interactions among the five elements. There are two types or cycles of interactions: generating (or sheng in Chinese) and overcoming (or ke in Chinese). The generating interaction includes that wood feeds fire, fire creates earth (or ash), earth bears metal, metal carries water, and water nourishes wood; while the overcoming interaction includes that wood parts earth, earth absorbs water, water quenches fire, fire melts metal, and metal chops wood.

From the modern scientific view, how many fundamental elements are there in the nature? And how do these fundamental elements interact one another? Chemists have found 118 chemical elements. But they are not fundamentals because all elemental atoms are made up of three types of particles: protons, neutrons, and electrons. Physicists have found over 300 elementary particles and each of them has a corresponding antiparticle. They are categorized into hadrons and leptons according to their participation in the strong interaction or not. All hadrons are made up of quarks, which have six types or flavors. Physicists have



also made a periodic table for particles. This periodic particle table includes 57 particles in total. But these particles are still not fundamental elements of matter because they have a lot of common properties.

Recently, the author [43, 45] proposed that in the nature there are only four fundamental elements, which are the massless radiation (or light), mass, electric charge, and color charge. Any known matter or particle should be only composed (or a combination) of one or more of these fundamental elements (Table 1). For instances, photons are radiations only, neutrons and neutrinos are masses only, protons and electrons are combinations of masses and electric charges, and quarks are combinations of masses, electric, and color charges, etc. A particle that contains only electric charge (e.g. the Weyl fermion such as the massless electron) predicted by Weyl [46] nine decades ago was recently discovered by Xu et al. [47] based on theoretical predictions from a team led by M. Z. Hasan [48-49].

Table 1: Four fundamental elements in the nature, which are radiation, mass, electric charge, and color charge. Any known matter or particle is a combination of one or more these fundamentals.

Particles	Real Energy		Imaginary Energy	
	Radiation (γ)	Mass (M)	Electric Charge (Q)	Color Charge (C)
Photon	✓			
Neutron		✓		
Weyl Fermion			✓	
Proton		✓	✓	
Quark		✓	✓	✓

Radiation and mass are further considered as two forms of real energies, while pure electric and color charges are two forms of imaginary energies. Energy of any charged particle including quarks is a complex number. Einstein’s mass-energy relation is then reformed as this

$$E = E_M + E_g + i(E_Q + E_C), \tag{4}$$

where i is the imaginary number, and $E_M = mc^2$, and $E_\gamma = h\nu$ are real energies of mass and radiation (both were obtained by Einstein in 1905), while $E_Q = Qc^2/(4\pi\epsilon_0G)^{1/2}$ and $E_C = Cc^2(\alpha/G)^{1/2}$ are imaginary energies of electric and color charges (both were given by the author recently). Here h is the Planck constant, ν is the frequency of the radiation, Q is the electric charge, C is the color charge, and α is the coupling constant of strong interaction.

Among these four fundamental elements, there are ten fundamental interactions [43]. The interaction between real energies is the gravitational force, which has three types: mass-mass, mass-radiation, and radiation-radiation interactions. Calculating the work done by the mass-radiation interaction on a photon derives the expression of Einstein’s gravitational redshift. This mass-radiation interaction may also explain the deflection of starlight by the Sun. The interactions between imaginary energies include the electromagnetic force between electric charges, the weak force between electric and color charges, and the strong force between color charges. In addition, we have four imaginary forces between real and

imaginary energies, which are mass-electric charge, radiation-electric charge, mass-color charge, and radiation-color charge interactions. These imaginary forces may explain why charges always attach on masses. All the fundamental interactions are unified as a single interaction between complex energies,

$$\vec{F}_{EE} = -G \frac{E_1 E_2}{c^4 r^2} \hat{r}, \tag{5}$$

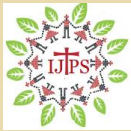
(see Figure 4 in [43]). Substituting the complex energy Eq. (4) into Eq. (5) and replacing the expression of each type of energy, we have

$$\begin{aligned} \vec{F}_{EE} &= \vec{F}_{RR} + \vec{F}_{II} + i\vec{F}_{RI} \\ &= -G \frac{[E_{1\gamma} + E_{1M} + i(E_{1Q} + E_{1C})] \times [E_{2\gamma} + E_{2M} + i(E_{2Q} + E_{2C})]}{c^4 r^2} \hat{r} \\ &= -G \frac{(E_{1\gamma} + E_{1M}) \times (E_{2\gamma} + E_{2M})}{c^4 r^2} \hat{r} + G \frac{(E_{1Q} + E_{1C}) \times (E_{2Q} + E_{2C})}{c^4 r^2} \hat{r} \\ &\quad - G \frac{(E_{1\gamma} + E_{1M}) \times (E_{2Q} + E_{2C}) + (E_{1Q} + E_{1C}) \times (E_{2\gamma} + E_{2M})}{c^4 r^2} \hat{r} \\ &= -G \frac{M_1 M_2}{r^2} \hat{r} - G \frac{h\nu_1 h\nu_2}{c^4 r^2} \hat{r} - G \frac{M_1 h\nu_2 + M_2 h\nu_1}{c^2 r^2} \hat{r} + \frac{Q_1 Q_2}{4\pi\epsilon_0 r^2} \hat{r} \tag{6} \\ &\quad + \alpha \frac{C_1 C_2}{r^2} \hat{r} + \sqrt{\frac{\alpha}{4\pi\epsilon_0}} \frac{Q_1 C_2 + Q_2 C_1}{r^2} \hat{r} \\ &\quad - i \left(\sqrt{\frac{G}{4\pi\epsilon_0}} \frac{M_1 Q_2 + M_2 Q_1}{r^2} \hat{r} + \sqrt{\alpha G} \frac{M_1 C_2 + M_2 C_1}{r^2} \hat{r} \right) \\ &\quad - i \left(\sqrt{\frac{G}{4\pi\epsilon_0}} \frac{h\nu_1 Q_2 + h\nu_2 Q_1}{c^2 r^2} \hat{r} + \sqrt{\alpha G} \frac{h\nu_1 C_2 + h\nu_2 C_1}{c^2 r^2} \hat{r} \right) \\ &= \vec{F}_{MM} + \vec{F}_{\gamma\gamma} + \vec{F}_{M\gamma} + \vec{F}_{QQ} + \vec{F}_{CC} + \vec{F}_{QC} + i\vec{F}_{MQ} + i\vec{F}_{MC} + i\vec{F}_{\gamma Q} + i\vec{F}_{\gamma C} \end{aligned}$$

There are ten fundamental interactions among the four fundamental elements of nature: mass, radiation, electric charge and color charge. Mass and radiation are real energies, while electric and color charges are imaginary energies. The nature is a system of complex energy and all the fundamental interactions of nature are classically unified into a single interaction between complex energies. There are six real and four imaginary interactions among the four fundamental elements. All these interactions as shown in Eq. (6) can be listed in Table 2.

Table 2 Fundamental elements and interactions of the nature.

Forces	M	γ	iQ	iC
M	\vec{F}_{MM}	$\vec{F}_{M\gamma}$	$i\vec{F}_{MQ}$	$i\vec{F}_{MC}$
γ		$\vec{F}_{\gamma\gamma}$	$i\vec{F}_{\gamma Q}$	$i\vec{F}_{\gamma C}$



iQ			\vec{F}_{QQ}	\vec{F}_{QC}
iC				\vec{F}_{CC}

There are two types of electric charge, positive and negative, and thus two types of electromagnetic interactions, repulsive between like charges and attractive between unlike charges. There are three types of color charges usually denoted as red, green, and blue and thus six types of strong interactions: red-red, red-green, red-blue, green-green, green-blue, and blue-blue interactions. There are also six types of weak interactions: positive-red, positive-green, positive-blue, negative-red, negative-green, and negative-blue interactions. Considering the strong interaction to be asymptotically free [50], The author replaced the color charge C by rC , which refers to that the color charges become less colourful when they are closer [43]. This leads to the weak force depends on (or is an odd function of) the radial distance rather than the square of it, while the strong force is independent of the radial distance. These characteristics of weak and strong forces are consistent with measurements.

⁴God saw that the light was good, and he separated the light from the darkness. ⁵God called the light "day" and the darkness he called "night." And there was evening, and there was morning - the first day. Here, before the creation of the light, the universe was darkness, i.e. in the evening. After the creation of the light, the universe began its daytime, i.e. the morning at first. Lighting the dark universe, God changed the universe from night to day (i.e. darkness to brightness or evening then morning). We usually say a day morning then evening, but in the Genesis of bible, it always said a day first evening then morning. That God saw that light was good indicates that he liked the daytime more than the night. Therefore, the first day of creation was actually a long day. It contained the entire time period for God to create the 3D infinite and empty space, to make matter and fill in the space with a full of matter, to power the matter with motion and start the time, to create the fundamental forces and issue inertia, and to generate light that switched the entire space or the grand universe from night to day. It should not just be the earth day, which is only the time needed for the earth that we reside in to make one rotation about its axis, i.e. 24 hours. In fact, at this moment, the Sun, the planets including our earth, and the moon were not formed and placed yet, and thus it is meaningless to say the earth day.

3. CONCLUSION

The first day was the day of creating the entire space. It was the time for God to change the darkness of the entire space (empty) to the lightness of the entire spacetime (with matter and light). Therefore, in the first day, God created the entire space and time, the matter and motion, the energy, and the radiation and light with the four fundamental interactions. The earth refers to the world of matter or the infinite entire space and the water is the initial super fluidal neutral matter that God initially created for everything to be made from. The night or evening refers to the time period before light was created and the day or morning is the time period after light was created.



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