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GENESIS AND BLACK HOLE UNIVERSE: THE SECOND DAY

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ABSTRACT

The biblical cosmology is apparently neither consistent with objections of the universe nor able to be fully addressed, described, and understood by the standard big bang cosmological model. Recently, the author has found that his newly well-developed black hole universe model does not have to reject or exclude the creation of the entire universe, the infinite grand universe, and can further provide an innovative interpretation of the book of Genesis. In Paper-I, the author has fully addressed the first day of Genesis according to the black hole universe model. In this paper (as Paper-II), he will further interpret the second day of Genesis. God created the entire universe with matter and light, space and time, forces and motion in the first day, while in the second day God structured the entire universe by separating the matter and space with layers and further formed our finite black hole universe. From the infinite entire universe to our finite black hole universe, there are infinite layers, whose boundaries are called as event horizons in physics or vaults in the book of Genesis. This effort attempts to bridge the gap between Genesis and observations of the universe and to bring a better understanding and wider acceptance to the Genesis.

Keywords: Genesis; Cosmology; Black Hole; Universe

1. INTRODUCTION

In Paper-I [1], the author has interpreted the first day of Genesis according to the black hole universe model, a new cosmology that the author recently developed [2-14]. The first day of creation was a long day. It contained the entire time period for God to create the three-dimensional (3D) infinite and empty space (called earth in the book of Genesis), to make matter and fill it into the empty space, to power the matter with motion and hence start the time, to create the fundamental forces and issue inertia of motion, and to generate light so that switched the entire space or the grand universe from darkness to brightness or from night to day. The first day is not our earth day (i.e. 24 hours), the time needed for our earth to make one rotation about its axis. In the first day, the Sun, planets including our earth, moon and even our finite black hole universe were actually not formed and placed yet, and thus it is meaningless to say the earth day.

In this paper (as Paper-II), the author aims to interpret the second day of Genesis on the basis of the interpretation of the first day according to the black hole universe model. In the second day, God structured the entire space that he created in the first day into layers by separating the waters (i.e. the matter or super fluidal substance that God made and filled into the space) with vaults, which in physics can be understood as event horizons. God did this work by only setting the light speed as the speed limit for any matter and particles. In the first

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chapter, the first through fifth sections, the book of Genesis describes the first day's work by God. In this paper, we interpret the second day's work by God from the first chapter, the sixth through eighth sections.

Next papers will self-consistently explain God's work on the 3rd and 4th days. With overall of this sequence of study, we aim at an attempt to develop author's well-developed new cosmological model, for revealing the mysteries of the universe and wiping out the discrepancy between science of cosmology and the book of Genesis. It provides a new interpretation of Genesis and meanwhile supports the black hole universe model in terms of Genesis. Through this effort, we will demonstrate the black hole universe model to be not only scientific because it reveals truths and self-consistently explains observations of the universes, but also philosophical because it is complete and simply answers questions and overcome difficulties without any non-testable hypothetical entities, and further theological because it is biblical and innovatively interprets the Genesis of the bible.

2. GENESIS AND BLACK HOLE UNIVERSE: THE 2nd DAY

In this section, we interpret the second day of Genesis according to the black hole universe model. We again apply the New International Version (NIV) of the bible [15].

2.1. Structuring the Entire Space with Layers

6 *And God said, "Let there be a vault between the waters to separate water from water."* 7 *So God made the vault and separated the water under the vault from the water above it. And it was so.* 8 *God called the vault "sky". And there was evening, and there was morning - the second day.* In the second day, God structured the entire infinite space by separating matter (i.e. the waters) with vaults or layers and further created our black hole universe, which is a finite spacetime with finite radius, mass, density, temperature, entropy, and so on. Here, the vault (or firmament in other versions of the bible) can be understood as the event horizon (or boundary) of black hole universe, which separated the water or matter inside (or below) the vault from the water or mater outside (or above) the vault. No water or matter even the light can flow up through or escape across the vault from inside (or under the vault) to outside (or above the vault). It is the boundary for matter and light to be able to go or, in other words, the boundary for our views to reach. The sky, which we can view (and where stars shine), is limited by or extended to the vault or the event horizon. The sky or called celestial dome is everything that lies above the surface of our earth including the atmosphere and outer space. The water above the vault cannot be understood as the raindrops and vapours from clouds, because the vault should be much higher (as high as stars we can view) than the height of clouds.

In general, the size of a vault or amount of matter enclosed by the vault (or in other words, the radius and mass of a black hole universe or spacetime) can be determined according to the measurement of the mass density in terms of first Eq. (2) and then Eq. (1) in Paper-I. For an instance, at present, the density of our black hole universe is measured to be about the critical density $\rho_0 \sim \rho_c = 3H_0^2/(8\pi G) \sim 9.2\times10^{-27}$ kg/m^3. Here the Hubble constant is chosen to be $H_0 \sim 70$ km/s/Mpc, a typical value of measurements [16-18]. Then, Eq. (2) of Paper-I determines the radius of the present universe to be $R_0 \sim 1.23\times10^{26}$ m, and then Eq. (1) of Paper-I determines the mass of the present universe to be $M_0 \sim 8.8\times10^{52}$ kg. Figure 1 plots, in terms of Eq. (2) of Paper-I, the density of a black hole (solid line) as a function of the radius (or the mass by 1 km = 0.3375 solar masses) [3, 14]. The dotted line refers to the density of the black hole universe at the present time, r_0. Its intersection with the solid line determines the radius and mass of the present black hole universe. The big bang model is not able to know the mass of the universe and thus cannot determine the radius of the present universe according to the measurement of the density.

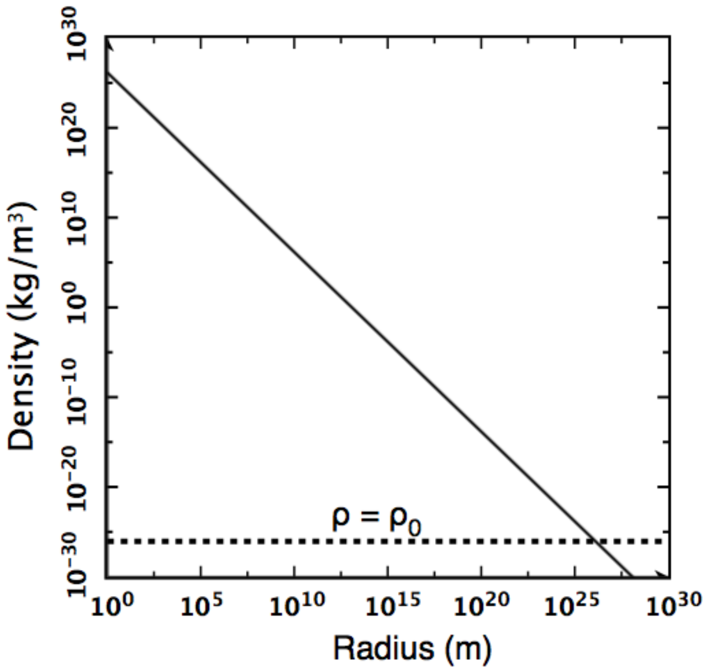

Fig. 1: The mass density of a spacetime or black hole including our black hole universe versus the radius [3,14]. The dotted line refers $r = r_0$, so that its intersection with the solid line determines the radius and mass of the present black hole universe.

2.2. Creating Vault

The vault or event horizon was automatically formed from gravitational attractions when God set the speed limit of matter including light to be a finite value as $c \sim 3\times10^8$ m/s in the vacuum. This greatly limits our view and constrains our observable universe to be finite. No such speed limit, we suppose to be able to view the entire universe. The difference between human beings and God is that of finiteness and infiniteness. The vault or event horizon, because any matter even light cannot escape from it, is darkness if it is viewed from outside. So, for us living under the vault or inside the event horizon, the outside cannot be seen because it is out of our view or is darkness or at night. God built the dark outside of the vault in the evening, and then made or fixed the bright inside of the vault in the day. Therefore, there was the darkness or evening outside the vault, there was the light or morning of the day inside the vault. That was the second day, which again was not the earth day with 24 hours, the time period for our earth axially rotating one revolution. The second day was the day of structuring the infinite entire space with infinite layers and further creating our finite universe. It was the time needed for God to form the event horizons or vaults and thus separate mater outside (i.e. the side of darkness or night) from inside (i.e. the side of lightness or day).

The initial hovering or moving to and fro of God’s spirit perturbs the matter here and there in the entire space or the grand universe and the gravitation created by God causes the matter (or God’s waters) to collapse due to Jeans instability [19] when matter’s pressure is not strong enough to prevent from gravitational collapse and to form black holes or subspacetimes everywhere, by considering that any region, where matter accumulates up to a critical point such that $M/R = c^2/(2G) \sim 6.75 \times 10^{26}$ kg/m (i.e. satisfying the Mach-Schwarzschild mass-radius relation), forms a black hole [1]. This separation of the matter structures or separates the entire space or the grand universe first into two layers as shown in Figure 2, and then more layers further. In principle, within the infinite entire space, there must have infinite black holes or subspacetimes with infinite large in radii and masses (or zero limits of density and temperature) to be constructed. In Figure 2, we have only sketched four of them for simplicity. The separation of matter keeps to go layers deeper and deeper until the subspacetimes or layers formed to be finite in size, mass, temperature, and entropy like our black hole universe and also like the child universes such as the observed star-like, massive, and supermassive black holes. Figure 2 can also be used to refer to any two adjacent layers (either infinite or finite), because the spacetimes are hierarchically structured with similarities and governed by the same physics.

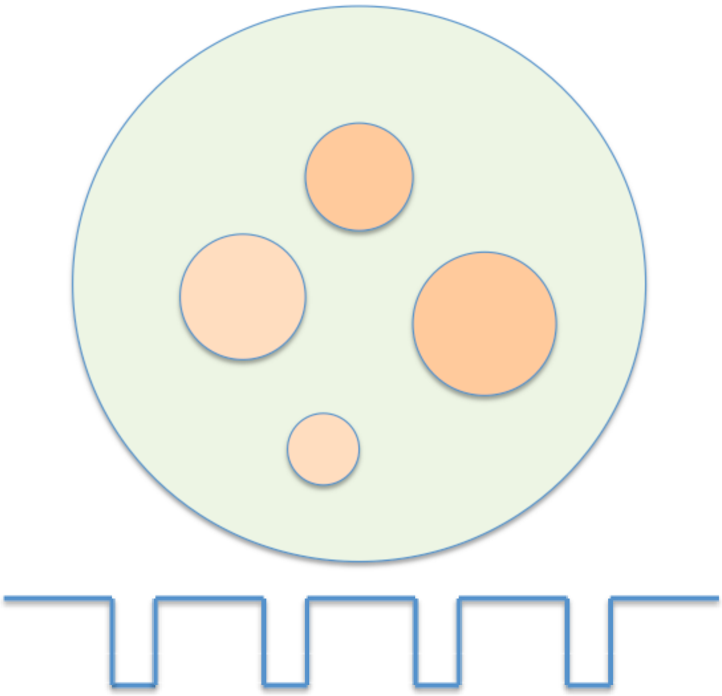

Fig. 2: The outermost two layers. They include the grand universe or spacetime and its child black hole universes (or subspacetimes). Any two adjacent layers can have a similar structure of this schematic such as the innermost two layers including our black hole universe and the inside star-like, massive, and supermassive black holes (i.e. the child universes). Both top and bottom panels sketch the two layers of a spacetime (or a parent black hole) with four subspacetimes (or child black holes).

2.3. Creating Our Black Hole Universe

To form our finite black hole universe or spacetime with finite radius, mass, density, temperature, and entropy from the infinite entire spacetime with zero for the matter density and absolute temperature and infinity for the mass and radius, there must have infinite separations or vaults (i.e. event horizons) to be formed. As described in the black hole universe model, the entire space is considered to be infinite without an edge and have infinite

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layers [3, 4, 14]. All layers or universes are self-similarly separated by event horizons (or vaults in the book of Genesis), and governed by the same physics that includes the Einsteinian general theory of relativity with the FLRW metric, Mach-Schwarzschild M-R relation, and positive curvature constant. Figure 3 shows the infinite hierarchically layered spacetime [4, 14]. The outmost layer called the grand universe (i.e. the entire space that God initially created) is infinite in radius and mass with mass-radius ratio given by Eq. (1) of Paper-I, but zero for the density and the absolute temperature. The bottom layer is the layer of child universes. The second layer from the bottom is the layer of our universe and sister universes, which are finite and parallel one another. A child universe is a subspacetime of our universe; our universe is a subspacetime (or a child universe) of the mother universe; the mother universe is a subspacetime (or a child universe) of the grandmother universe; and so on. If we number the layer from the bottom layer (or child universe) to the top layer (or grand universe), we should have the count as 1, 2, …, to ∞.

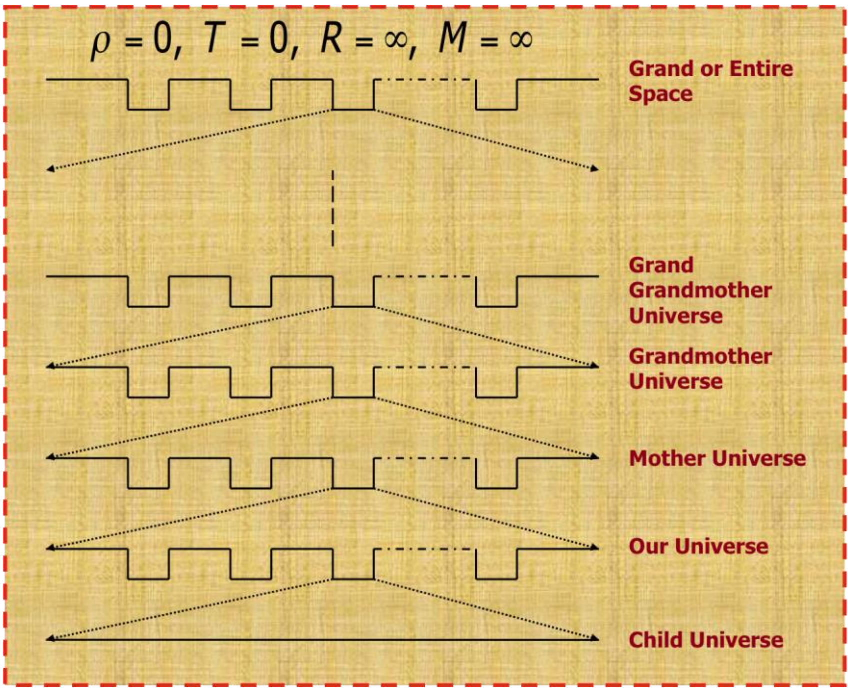

Fig. 3: The infinitely layered-structure of the entire space or grand universe [4, 14]. The outmost layer is the grand universe and the bottom (or innermost) layer is the layer of child universes. A child universe is a subspacetime of our universe, our universe is a subspacetime (or child universe) of mother universe, the mother universe is a subspacetime (or child universe) of grandmother universe, and so on.

This infinitely layered-structure of the entire space can be represented also by using the mathematics sets and subsets as shown in Figure 4 (also see [3, 14]), U = {…{F, F, F, ...{G, G, G, ...{A, A, A, ...{S, S, S, ...{C, C, C, ..., C} } } } }…}. Here the child universes (also niece universes) are null sets (i.e. C = {} and N = {}); the sister universes are sets of niece universes (i.e. S = {N, N, N, …, N}); our universe is a set of child universes (i.e. O = {C, C, C, …, C}); the mother universe is a set of our universe and sister universes (i.e. M = {S, S, S, …, O}); the aunt universes are sets of cousin universes (i.e. A = {Co, Co, Co, …, Co}); and the grandmother universe is the set of aunt and mother universes (i.e., G = {A, A, A, …, M}), and so on. The grand universe U is the grand set of all universes.

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To view the layered black hole universes more clearly step by step, we first sketch the bottom or innermost two layers that include our black hole universe and child universes such as the observed star-like, massive, and/or supermassive black holes. The existence of black holes was first predicted from the Schwarzschild solution of the Einsteinian general relativity, then candidates observed later, and especially recently confirmed by LIGO that directly detected first ever gravitational waves from mergers of binary black holes [20]. Up-to-the-date, there are a number of gravitational wave events of black hole mergers have been confirmed by LIGO. The schematic diagram of the innermost two layers is similar to Figure 2. In this simple sketch we have only drawn four child universes.

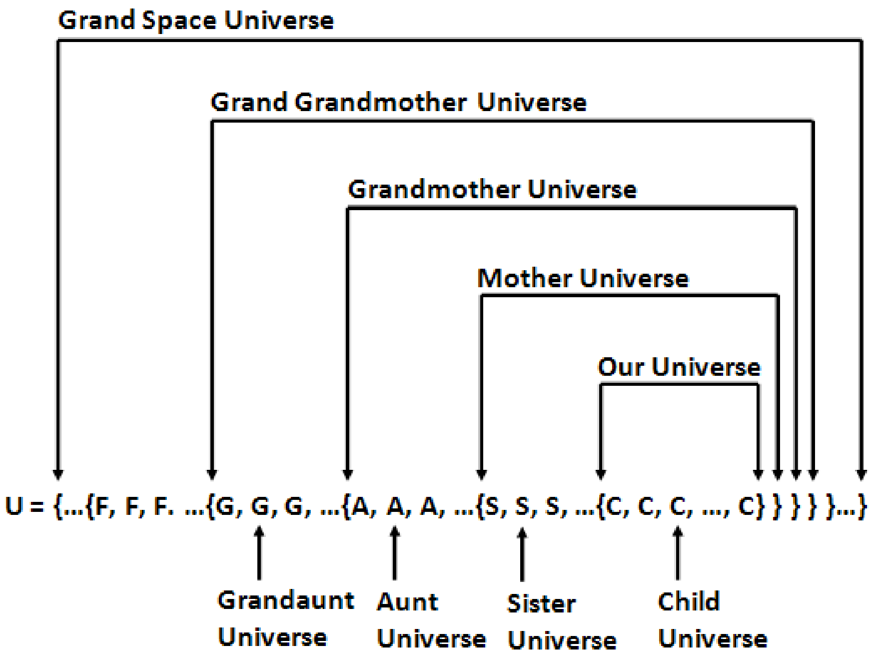

Fig. 4: A mathematical representation of sets of universes for an infinite large and layered spacetime [3] [14]. An inner layer universe set is a subset of the outer layer universe set. The niece and child universes are null sets because they do not contain any subspacetime.

To see more clear on the structure of spacetimes, we can sketch the innermost three and four layers in Figure 5, which are also structures of any adjacent three or four layers. For our universe to be expanding, there must exist outside, the mother universe. For the mother universe to be expanding, we should have grandmother universe, etc. The innermost three layers plotted in the left panel include the universe that we are living, the outside called mother universe, and the inside star-like and supermassive black holes called child universes. We have only plotted three child universes and did not plot the sister universes. There should have a great number of child universes and might also have many sister universes. The innermost four layers plotted in the right panel include further to the grandmother universe. The mother and aunt universes are children of the grandmother universe. The cousin universes are children of the aunt universes. Our universe, the sister universes, and the cousin universes have their own children, which are the star-like, massive, or supermassive black holes. These four generations of the universe family can also be represented by a universe family tree (see Figure 6 and also [3,14].

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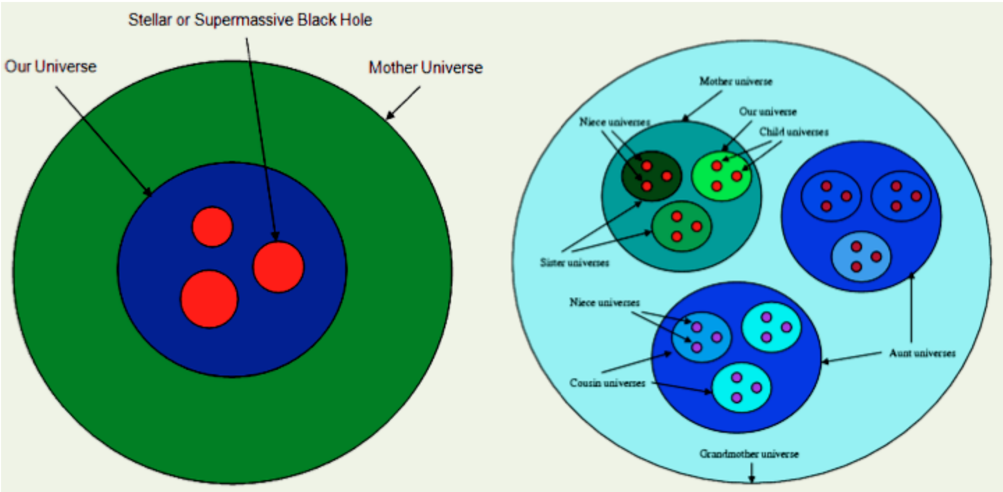

Fig. 5: The left panel shows the innermost three layers of the entire space that is structured hierarchically up to the mother universe (coded as green) [3] [14]. Here within our black hole universe (coded as blue), we only drew three child universes (coded as red), corresponding to the star-like or supermassive black holes. The right panel shows the innermost four layers of the entire space that is structured hierarchically up to the grandmother universe [3] [14]. Here we also drew two sister universes that are parallel to our black hole universe and two aunt universes that are parallel to our mother universe.

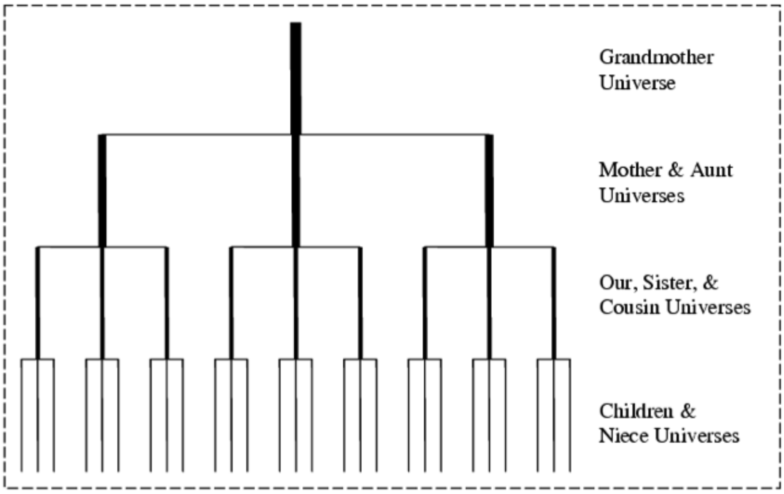

Fig. 6: A family tree for the innermost four layers or the youngest four generations of the universe family [3] [14]. The generation one includes the child and niece universes; the generation two includes our universe itself and the sister universes; the generation three includes the mother and aunt universes; and the generation four includes the grandmother universe. We have only drawn three children for each parent.

The evolution of the space structure is iterative [3, 14]. In each of iterations, the matter reconfigures and the universe is renewed rather than a simple repeat or bouncing back. Figure 7 shows a series of sketches for the cartoon of the universe evolution in a single iteration from the present universe to the next similar one (from the top left to bottom right). This whole spacetime evolution process does not have the end once the God started the beginning. As our universe expands, the child universes (i.e. the inside star-like, massive, and supermassive black holes) grow and merge each other into a new universe as LIGO detected gravitational wave events. Therefore, when one universe expands out, a new similar universe is born from inside. Like the living things in the nature, the universe passes through its own birth, growth, and death process and iterates this process endlessly. Its structure evolves iteratively forever without the end after God started the beginning from his spacetime creation. Without God, then the evolution must be beginningless.

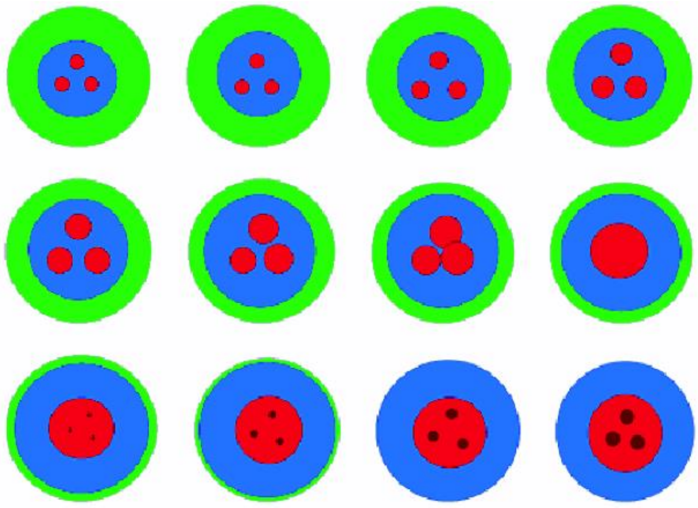

Fig. 7: A series of sketches or a cartoon, from left to right and then top row to bottom row, for the black hole universe to evolve in one iteration from the present universe to the next similar one [3] [14]. This is an irreversible process, in which matter and spacetime reconfigure or structure rather than simply repeat or bounce back. One universe expands to age out and a new universe is born from its inside.

2.4. Dynamics of Our Black Hole Universe

Einstein's general relativity is the theory that describes the effect of matter on spacetime. The governing equation of this theory is the field equation, given by

$$G_{mn} = \frac{8pG}{c^4} T_{mn}, \tag{1}$$

where $G_{\mu\nu}$ is the Einsteinian curvature tensor of spacetime and $\underline{T_{\mu\nu}}$ is the energy-momentum tensor of matter in spacetime [21]. Substituting the FLRW metric of spacetime (Eq. 3 of Paper-I) into Einstein's field equation (Eq. 1) of his general theory of relativity, we have the Friedmann equation [22]

$$H^2(t) \equiv \frac{\dot{R}^2(t)}{R^2(t)} = \frac{8\pi G\rho(t)}{3} - \frac{c^2}{R^2(t)}, \tag{2}$$

Substituting density expression Eq. (2) of Paper-I into Eq. (2) above, we have $H(t) = 0$ or $dR(t)/dt = 0$. This implies that a spacetime or black hole does not expand or in a static state when nothing (neither matter nor radiation) enters. In this case, the spacetime or black hole is in equilibrium, which we have named as the law of spacetime equilibrium, or the first law of black hole universe [14].

Accreting matter from outside or merging with another, a spacetime or black hole including our black hole universe becomes dynamic and expands [2, 3, 14]. From the Mach-

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Schwarzschild M-R relation Eq. (1) of Paper-I, one can have the expansion rate (or the time rate of change in radius) to be

$$\dot{R}(t) = \frac{2G}{c^2}\dot{M}(t), \tag{3}$$

or the Hubble parameter to be

$$\dot{H}(t) \equiv \frac{\dot{R}(t)}{R(t)} = \frac{\dot{M}(t)}{M(t)}. \tag{4}$$

Eq. (3) or Eq. (4) indicates that the time rate, at which a spacetime or black hole including our black hole universe expands, is directly proportional to the time rate, at which it accretes matter from the outside. In the recent review of the black hole universe model, the author has named this relationship of the rates of size expansion and matter gain as the law of spacetime expansion [14]. A spacetime or black hole becomes dynamic when it accretes matter or merges with others.

Accreting matter from its outside at a rate of 10^{-5} solar masses per year, a spacetime or black hole with three solar masses can expand at a rate about 0.1 meters per year or have a Hubble parameter of $H(t) \sim 10^7$ km/s/Mpc. Swallowing matter from its outside at a rate of one thousand solar masses in one year to run a quasar, a supermassive black hole with one billion solar masses can expand at a rate about three thousand kilometers per years or have a Hubble parameter $H(t) \sim 10^6$ km/s/Mpc. When the black hole merges with other black holes, the growth rate should vary in time and be much larger in average than that when the black hole accretes its ambient matter. For our universe at the present state, the Hubble parameter is measured as $H(t_0) \sim 70$ km/s/Mpc [16, 18]. If the radius of the universe is chosen as about 14 billion light years as determined from the measured density and Hubble constant, we have that our universe expands in about c, the light speed in the vacuum, at present. To have such fast expansion, the universe must inhale about 10^5 solar masses in one second, or swallows a supermassive black hole in about a few hours. Introducing the cosmological constant Λ is introduced into the field equation (Eq. 1) as Einstein did for his static universe or as Riess et al. [23] and Perlmutter et al. [24] did for the accelerating universe, we can determine, from the black hole universe model, it as $\Lambda = 3H_0^2 = 3\left(\dot{M}/M\right)_{t=t_0} \sim 1.5\times 10^{-35}\,\mathrm{s}^{-2}$. This is first time to connect the cosmological constant with the Hubble constant. For a black hole with the Planck mass to be evaporated as the Hawking radiation [25], we have $\Lambda_P \sim 1.5\times 10^{84}$ s^{-2}, which is about 10^{119} times greater than the cosmological constant at the present. For the universe to be inflated by a factor of 10^{26} within 10^{-32} seconds [26], we have $\Lambda_B \sim 3\times 10^{96}$ s^{-2}, which is about 2×10^{131} times greater than the cosmological constant at the present [27, 28].

A spacetime or black hole including our black hole universe accelerates its expansion, when it accretes matter in an increasing rate, i.e. $\ddot{M}(t) > 0$ [8]. The dimensionless deceleration parameter is usually defined as

$$q(t) \equiv -\frac{R(t)\ddot{R}(t)}{\dot{R}^2(t)} = -\frac{M(t)\ddot{M}(t)}{\dot{M}^2(t)}. \tag{5}$$

This regularity of spacetime is called the law of spacetime acceleration [14]. It was combined with the law of spacetime expansion as the 2nd law of black hole universe. Here, the double

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dot sign refers to the second order derivative with respect to time. From Eq. (5), we see that whether the black hole universe accelerates or not depends on whether the double dot of mass is positive or not. For a positive $\ddot{M}(t) > 0$, we have a negative deceleration parameter $q(t) < 0$, i.e. acceleration of the universe.

According to the type Ia supernova measurements and their empirical luminosity distance-redshift relation, Daly et al. [29] obtained the deceleration parameter of the present universe as $q_0 \sim -0.5$ for the flat FLRW metric of spacetime with $k = 0$ (q_0 can be smaller for $k = 1$, e.g. - 0.6). To explain the recent acceleration of the universe, the big bang universe model suggests that the universe is dominated by dark energy up to about 73%. In the black hole universe model, however, the universe accelerates because it inhales the outside matter in an increasing rate. To accelerate its expansion with $q_0 \sim -0.5$, the present black hole universe only needs to inhale the outside matter in an increasing rate given by $\ddot{M}(t_0) = -q_0 M_0 H_0^2 = -c^2 q_0 R_0 H_0^2 / (2G) \sim 2.2 \times 10^{17}$ kg/s^2 (or about 110 solar masses per year square).

2.5. Explaining Observations of the Universe

To explain the type-Ia supernova measurements in accordance with the black hole universe model, we can first solve Eq. (5) to find the mass and Hubble parameter as functions of time. For a constant acceleration expansion universe, the time-dependent mass can be analytically solved from Eq. (5) as,

$$M(t) = M_0 \left[(q+1) H_0 t + 1 \right]^{\frac{1}{q+1}}. \tag{6}$$

Then, the time t can be replaced by the redshift z, because

$$1 + z \equiv \frac{R_0}{R(t)} = \frac{M_0}{M(t)} = \left[(q+1) H_0 t + 1 \right]^{-\frac{1}{q+1}}. \tag{7}$$

From the black hole universe model, the luminosity distance-redshift relation of supernovae can be determined from the mass-time relation as

$$d_L = (1+z) R_0 \sin\left[\int_r^0 \frac{c dt}{R(t)} \right] = (1+z) R_0 \sin\left[\int_r^0 \frac{c^3 dt}{2GM(t)} \right]. \tag{8}$$

Substituting Eq. (6) into Eq. (8), completing the integration and then using Eq. (7), we have

$$d_L = (1+z) R_0 \sin\left[\frac{c^3}{2GM_0 H_0} \frac{1 - (1+z)^{-q}}{q} \right]. \tag{9}$$

This redshift and luminosity distance relationship (Eq. 9) reduces to the Hubble law $z = d_L H_0 / c$ at small redshift $z << 1$ or for nearby objects.

Figure 8 plots the luminosity distance-redshift relation (red line) along with the type-Ia supernova measurements (blue dots. Credit: Union 2.1 compilation of 580 SNIA data from Supernova Cosmology Project [30, 31]). In this plot the Hubble constant is chosen to be $H_0 = 70$ km/s/Mpc and the deceleration parameter is chosen to be $q_0 = -0.6$. In the upper panel of Figure 8, the distance modulus, which is defined by $\mu = 5\log_{10} d_L - 5$ with d_L in parsecs, is plotted as a function of redshift; while in the lower panel of Figure 15, the distance

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modulus difference between the measured SNIA data and analytical results derived from Eq. (9). The results have shown that the black hole universe model can perfectly explain the measurements of type-Ia supernovae.

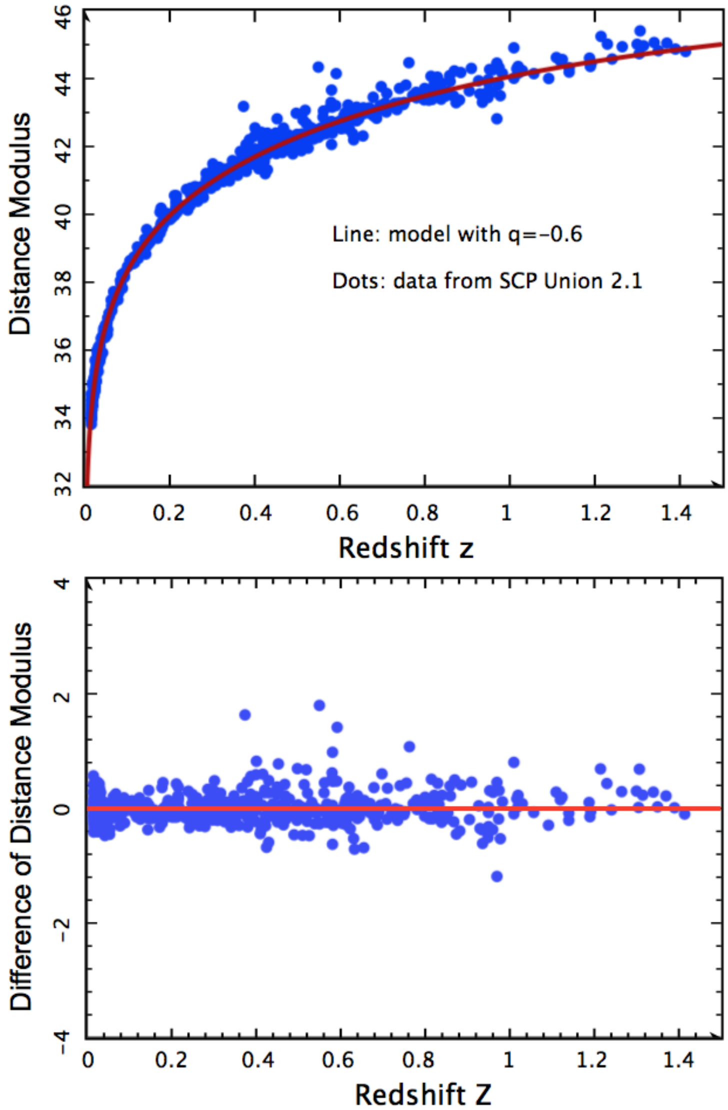

Fig. 8: Luminosity distance-redshift relation of type-Ia supernovae [8, 14]. Blue dots are measurements from the Union2 compilation of 580 SNeIa data from Supernova Cosmology Project [30,31]. Red lines are analytical results from this study with q = - 0.6. The upper panel plots the distance modulus as a function of redshift and the lower panel plots the distance modulus difference between the measurement data and theoretical results.

Recently, the author pointed out that the luminosity distance-redshift relation that was usually applied to analyze the measurement of distant type-Ia supernovae is an approximate expression that is only valid for nearby objects with $z << 1$ [6]. The luminosity distances of all distant type-Ia supernovae with $z\ ^3\ 1$ had been underestimated. He has corrected the luminosity distance expression with an extra redshift factor $\sqrt{1+z}$, with which the type-Ia supernova measurements do not lead to the acceleration of the universe and thus remove the

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need of dark energy.

In the black hole universe model, if we include this redshift factor, the luminosity distance expression (Eq. 9) becomes,

$$d_L = (1+z)^{3/2} R_0 \sin\left[\frac{c^3}{2GM_0H_0}\frac{1-(1+z)^{-q}}{q}\right]. \quad (10)$$

Using this equation, we can also nicely fit the data of type-Ia supernovae if the deceleration parameter is chosen about $q = 0.5$ (see Figure 9). This corrected luminosity distance-redshift relation excludes acceleration of the universe, so that removes the need of dark energy from the big bang universe model and the need of increasing its mass in an increasing rate from the black hole universe model.

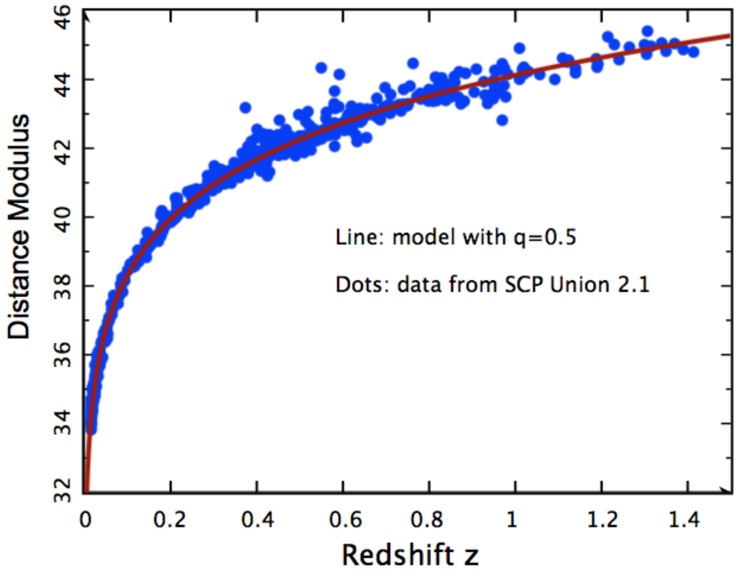

Fig. 9: Distance modulus versus redshift, obtained from the corrected luminosity distance-redshift relation with the redshift factor $\sqrt{1+z}$ and $q=0.5$ (red line) [6]. Blue dots are again the measurements credited by the Union2 compilation of 580 SNeIa data from Supernova.

As a spacetime or black hole including the black hole universe accretes its outside matter and radiation, it expands and cools down. The change of its temperature as a function of its radius is obtained by [4]

$$\frac{dT}{dR} = -\frac{3T}{4R}\left[1-\left(\frac{T_p}{T}\right)^4\right], \quad (11)$$

where T_p is the temperature outside. This equation governs the thermal history of the black hole universe that grew up from a star-like black hole through a supermassive black hole and a mini universe to the present state. For hot star-like or supermassive black holes, the temperatures inside should be much greater than the temperatures outside, i.e. $T \gg T_p$. In this case Eq. (11) can be simply solved as

$$R^3T^4 = C, \quad (12)$$

where C is an integral constant. Therefore, the temperature of a star-like or supermassive black hole decreases as it expands in size according to $T \propto R^{-3/4}$. Eq. (12) also tells us that the total radiation energy inside a star-like or supermassive black hole to be a constant and thus independent of its size. This interesting result indicates that the blackbody radiation energy inside a star-like or supermassive black hole remains the same no matter it is static or dynamic. Attaining matter and growing its size do not increase its total radiation energy. In recent review of the black hole model of the universe, the author has called this regularity of constant radiation energy as the law of radiation energy conservation (or the 3rd law of black hole universe).

A black hole, when it accretes its ambient matter or merges with another black hole, becomes dynamic. A dynamic black hole has a broken event horizon and thus cannot hold the inside hot (or high-frequency) blackbody radiation, which flows or leaks out of it and produces X-ray flares or gamma ray bursts. Dynamic star-like black holes with thousand billions of Kelvins (i.e. ~ 10^{12} K) radiate gamma rays, while dynamic massive or supermassive black holes with hundred millions of Kelvins (i.e. ~ 10^8 K) radiate X-rays such as X-ray emissions from quasars, supermmasive black holes with billions of solar masse, and X-ray flares from Sagitarius A*, a massive black hole with millions of solar masses at the Milky Way center. Therefore, according to the black hole model of the universe, we can self-consistently explain the gamma-ray bursts, X-ray flares from galactic centers, and quasars as the electromagnetic emissions of dynamic star-like, massive, and supermassive black holes [5, 7, 9-10, 12].

The possible thermal history of the black hole universe can be obtained by solving Eq. (11) in the general case that the black hole universe decreases its relative temperature in a rate slightly greater than the mother universe $T < T_b$. The result was plotted in Figure 10.

3. CONCLUSION

We have interpreted the second day of Genesis as the day of structuring the entire space. It was the time period for God to separate matter in the entire universe into layers. This was done by setting light speed as the speed limit for any type of matter and particles. From the infinite entire universe to our finite black hole universe, there are infinite layers, whose boundaries are called as event horizons in physics or vaults in the book of Genesis. This effort has bridged the gap between Genesis and observations of the universe and brought us a better understanding and believing to the Genesis.

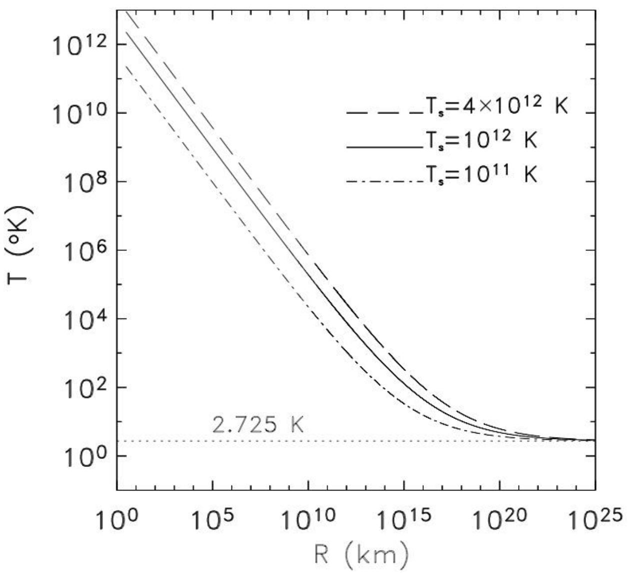

Fig. 10: The possible thermal history of the black hole universe with three different temperatures of the reference black holes [4]. All temperature lines are curved by concaving downward and approach ~ 2.725 K at the present as the black hole universe expands to the present size. The properties of the reference black hole do not affect the state of the present universe.

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