Title: The essence of force is the redistribution of spatial expansion

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Abstract: We propose a new cosmological model, based on which the essence of all forces in the universe is derived from the redistribution of spatial expansion. We discuss the interpretations of this model for the mass-energy formula, the photoelectric effect, quantum entanglement, and other astronomical observational phenomena. Those descriptions successfully unified relativity and quantum theory.

I. Introduction

This paper proposes a novel cosmological model called the Perfecting Cosmological Model, from which hypotheses about the nature of the universe are drawn. According to this model, the actual universe is an expanding closed space over time, where mass is converted into space. The cognitive universe represents the tangent space of the real universe at the point of observation. Variations in the distribution of mass-to-space transformation and discrepancies in how the cognitive universe perceives the actual universe leads to diverse physical phenomena.

II. Cosmological model

In Fig.1, the lines illustrate three-dimensional space, the circles symbolize actual universes at specific times, and the tangent lines denote the cognitive universe at those times for each node. The actual universe is an expanding closed space, and our perception of it can occur only at a single moment along its tangential direction.

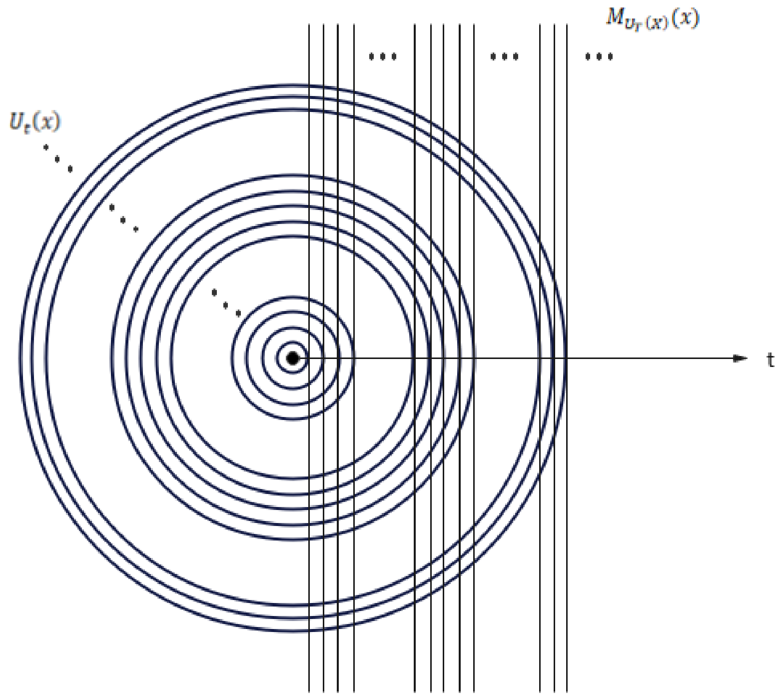


Fig. 1. Actual universe and cognitive universe

Fig.2 depicts the ongoing expansion of the universe, similar to continuously pouring a set number of beads into a gradually widening Dalton board. The base of that Dalton board must have a layer of beads that forms the foundation and maintains space. This foundational layer is called as implicit mass, whereas the remaining beads that make up substances are called as explicit mass. The conversion capability of explicit mass into expanding space is referred to as energy. All substances must contribute mass to the expanding space.

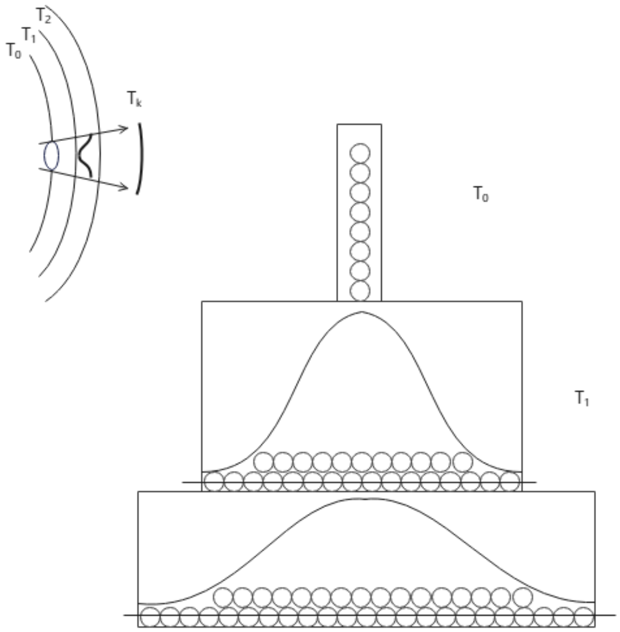


Fig. 2. Transformation of mass in an expanding universe

In Fig.2, a mass without external energy support would disperse into space, losing its explicit mass. In contrast, Fig.3 shows that an object that absorbs additional energy retains its explicit mass. This extra energy fulfills the spatial expansion need, allowing the object to fit within a smaller Dalton plate than initially required.

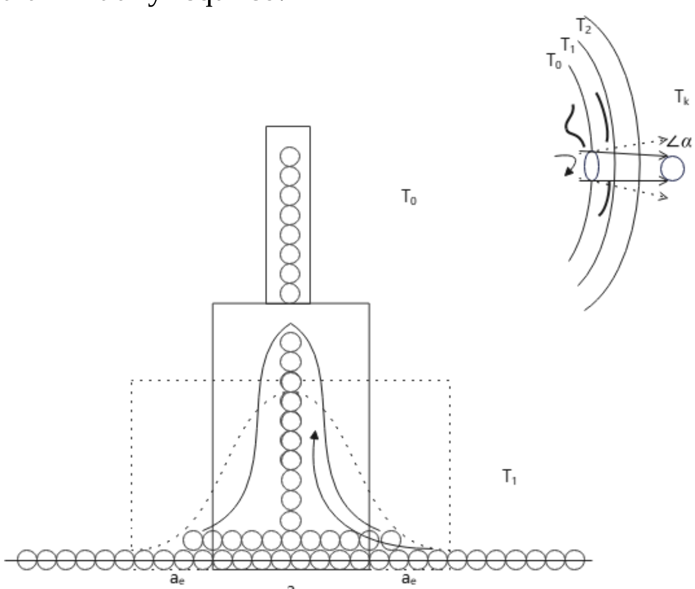


Fig. 3. Object that absorbs additional energy retains its explicit mass

III. Explanation of Physical Phenomena

A. *Spin and charge properties*

Expanding the view to two-dimensional and three-dimensional spaces, filling the newly expanded space inevitably leads to uneven diffusion around the edges. Imagine a Dalton plate in the shape of a cube rather than a cylinder; after expansion, the distribution in different directions is uneven. This is one reason particles typically have spin, with balance among different spin directions manifesting as different charge types. As shown in Fig.4, the uneven diffusion caused by the shape of the expansion requirement results in different diffusion for particles. The figures from left to right represent particles with two different charges and a neutral particle.

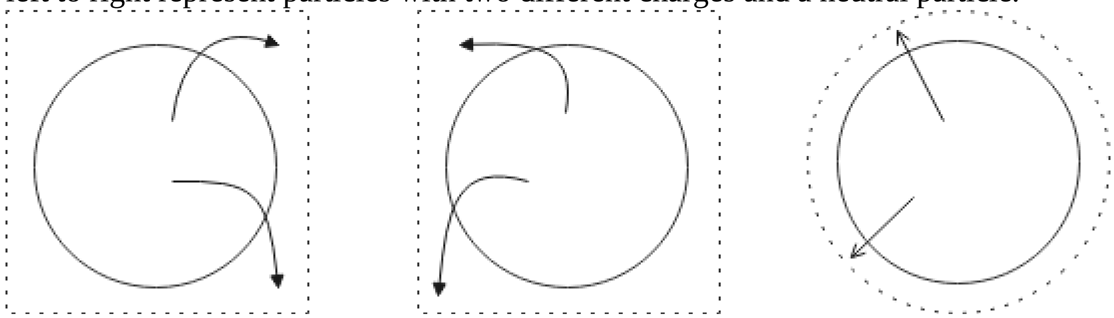


Fig. 4. Different expansion requirement shape

Fig.5 depicts attraction, where the expanding space requirement between two objects is shared, leading to the apparent convergence of their centers of mass. We can also say that the reason for the attraction is that the mass - specific contribution in the central part is lower than in other regions.

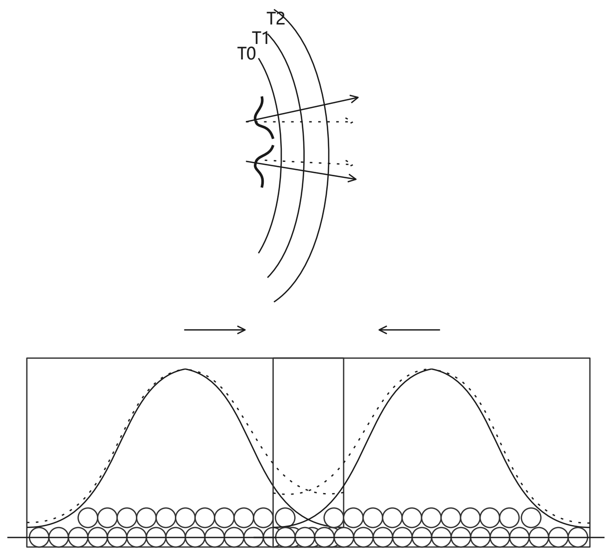


Fig. 5. Explanation of attraction

Fig.6 presents an extreme situation in which the mass - specific contribution in the middle amounts to zero.

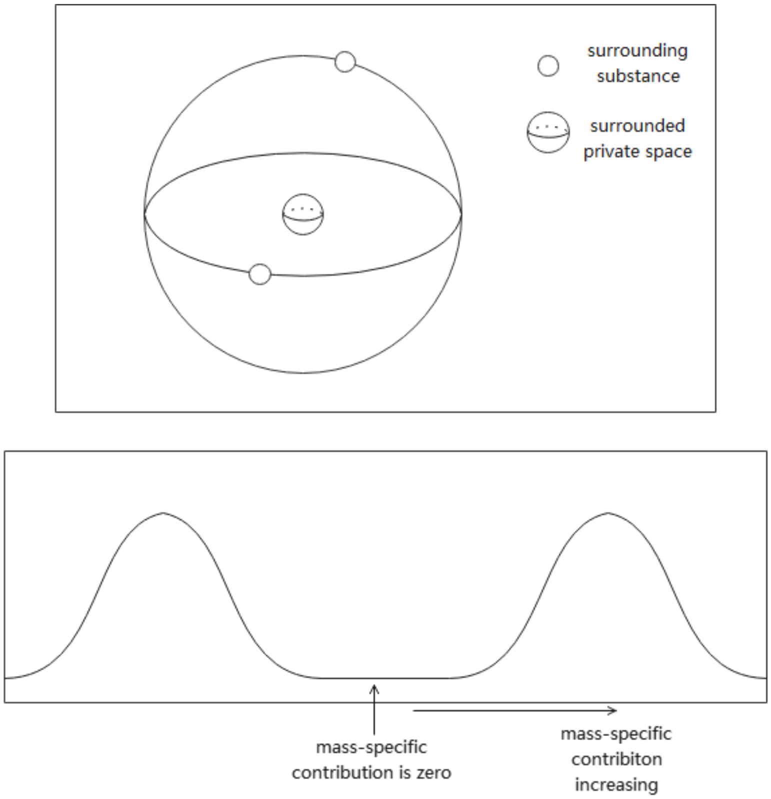


Fig. 6. Extreme attraction

In Fig.7, objects a and b, with object b being more massive, undergo an extra mass transformation c at time T_1. When the same amount of c is added, the force exerted on the Dalton board by a is greater. In the actual universe, this positional or angular change happens only once; it is the continuous expansion of the universe that appears as speed in the cognitive universe. This includes the variation in expansion speed in the cognitive universe due to this angle change. In the cognitive universe, the farther the distance, the faster the expansion.

Based on the explanation of charge properties, attraction, and motion, the essence of force lies in the redistribution of spatial expansion.

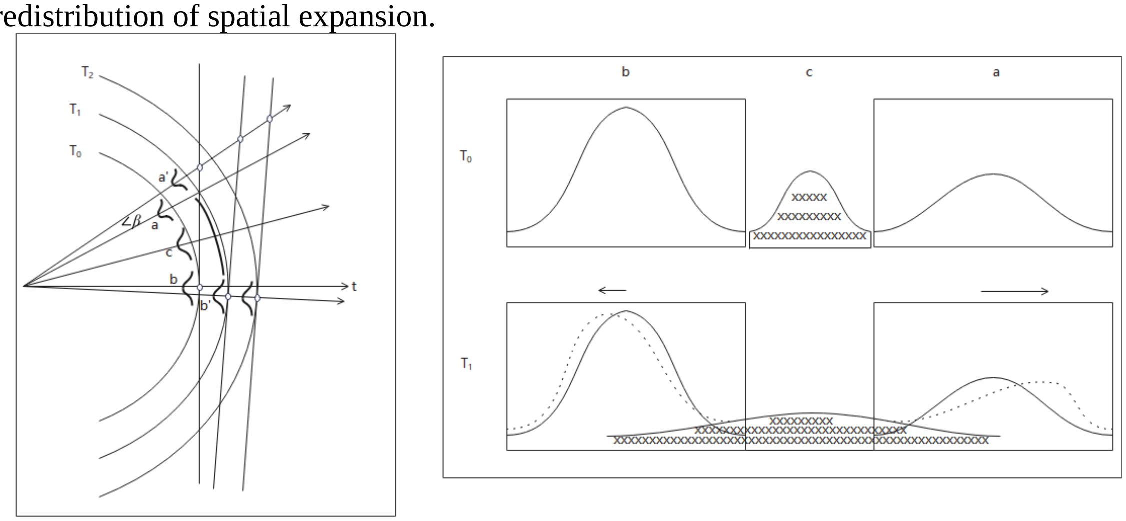


Fig. 7. Explanation of motion

B. Explanation of the speed of light

Fig.8 shows the accelerated expansion of the cognitive universe and the absolute but variable nature of the speed of light. The change at point a on the actual universe timeline T_3 is perceived immediately upon reception by the cognitive universe T_3 after being received. However, in the cognitive universe, it is believed that the change at point a occurs on the time line T_0, leading to the conclusion of a finite maximum speed, the speed of light. In the cognitive universe, the speed of light is $c = \frac{dS}{dT}$. In the upper part of Fig.8, the speeds between the three points are also c, meaning that objects moving at the speed of light in the cognitive universe, whether approaching or receding from each other, maintain a speed of c relative to each other which is the theory of the absolute speed of light. From different time points' $\frac{dS}{dT}$ in the upper part of Fig.8 it can be seen that the cognitive speed of light based on the same pair of points increases with the expansion of the universe or the extension of the timeline. From the two sets of points in the lower part of Fig.8, it can be observed that the cognitive speed of light based on different points increases as the distance decreases, which corresponds to Hubble's law[1].

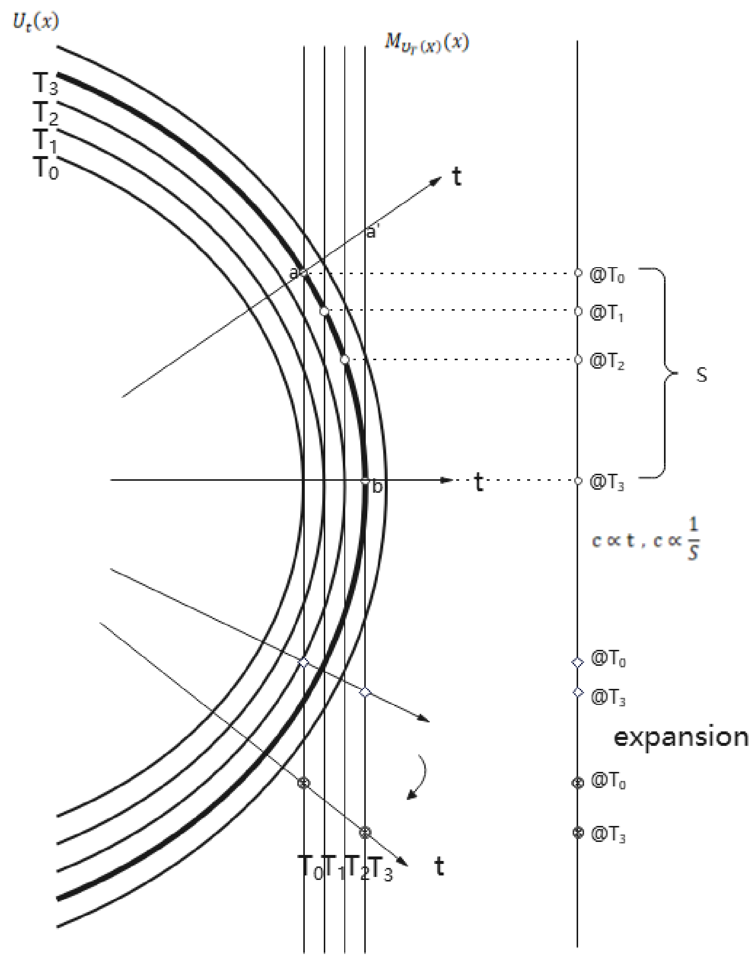


Fig. 8. Speed of light

C. *Hubble's Law*

The expansion speed at point A in Fig.9 is $v = \frac{\Delta S}{\Delta T} = \frac{S}{T}$, combining with Hubble's law $v = H_0 D$, we obtain $H_0 = \frac{1}{T}$, meaning that the Hubble constant is the reciprocal of the age of the universe. However, the Hubble constant that we usually calculate is in units of (km/s)/Mpc, denoted as $H_{0c} = H_0 \cdot c$. Combining this with the speed of light $c = \frac{S}{\Delta T}$, we derive

$$H_0 = \frac{1}{T} = \frac{\frac{1}{T}\cdot\frac{S}{\Delta T}}{\frac{S}{\Delta T}} = \frac{\frac{1}{T}\cdot\frac{S}{\Delta T}}{c} \approx \frac{\frac{2}{2T+\Delta T}\cdot\frac{S}{\Delta T}}{c} = \frac{\frac{2\cdot S}{S^2}}{c} = \frac{\frac{2}{S}}{c} \tag{1}$$

When c is fixed, $H_{0c} = \frac{2}{S}$, the calculated Hubble constant will be inversely proportional to the distance.

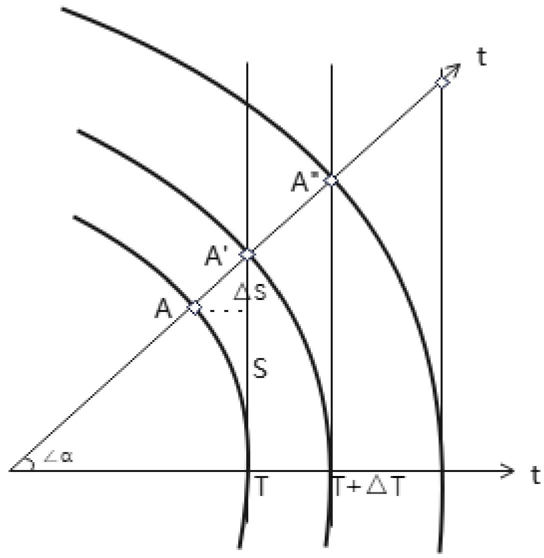


Fig. 9. Hubble's Law

D. *Mass-energy equivalence equation*[2]

Fig.10 shows the formula $E = mc^2$.

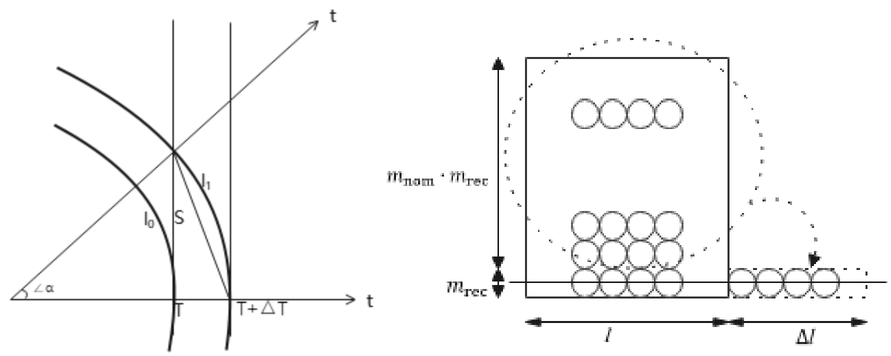


Fig. 10 Formula $E = mc^2$

$$E = mc^2 = m\frac{S^2}{\Delta T^2} = m\frac{(T+\Delta T)^2 - T^2}{\Delta T^2} = m\frac{(T+\Delta T)+T}{(T+\Delta T)-T} = m\frac{l_1+l_0}{l_1-l_0} \tag{2}$$

then we can get

$$E = \frac{m_{nom}\cdot m_{rec}\cdot l}{m_{rec}\cdot \Delta l} \tag{3}$$

where l is the substance occupied space, Δl is its expanding space, m_{rec} is the implicit mass per space, $m_{nom} \cdot m_{rec} \cdot l$ is the explicit mass of the substance. Energy can be interpreted as the ability to achieve spatial expansion. When $\Delta l = m_{nom} \cdot l$, $E = 1$, indicating that the explicit mass of the substance has been precisely converted to the required expanding space, it has no external influence.

E. *Meaning of the measured speed of light*

The premise of observation is that the energy converted at the source end is greater 1.

$$E = \frac{\Delta m_{nom}\cdot m_{rec}\cdot l_i}{m_{rec}\cdot l_1} = \frac{t_d\cdot m_{nom_i}\cdot m_{rec}\cdot l_i}{m_{rec}\cdot l_1} \geq 1 \tag{4}$$

m_{nom_i} is the normalized mass of the converted photon per unit time per unit space, and l_i is the photon space.

Fig.11 shows the measured speed of light.

$$\mathrm{c} = \frac{S}{\Delta\, t + t_d} \approx \frac{l_1}{t_d} \leq m_{nom_i} \cdot l_i \tag{5}$$

$$c_{max} = m_{nom_i} \cdot l_i \tag{6}$$

Within the proposed framework, Eq.(6) demonstrates that measured light speed fundamentally represents the temporal derivative of normalized photon mass. This interpretation bridges classical electrodynamics and quantum field theoretic descriptions of photon interactions.

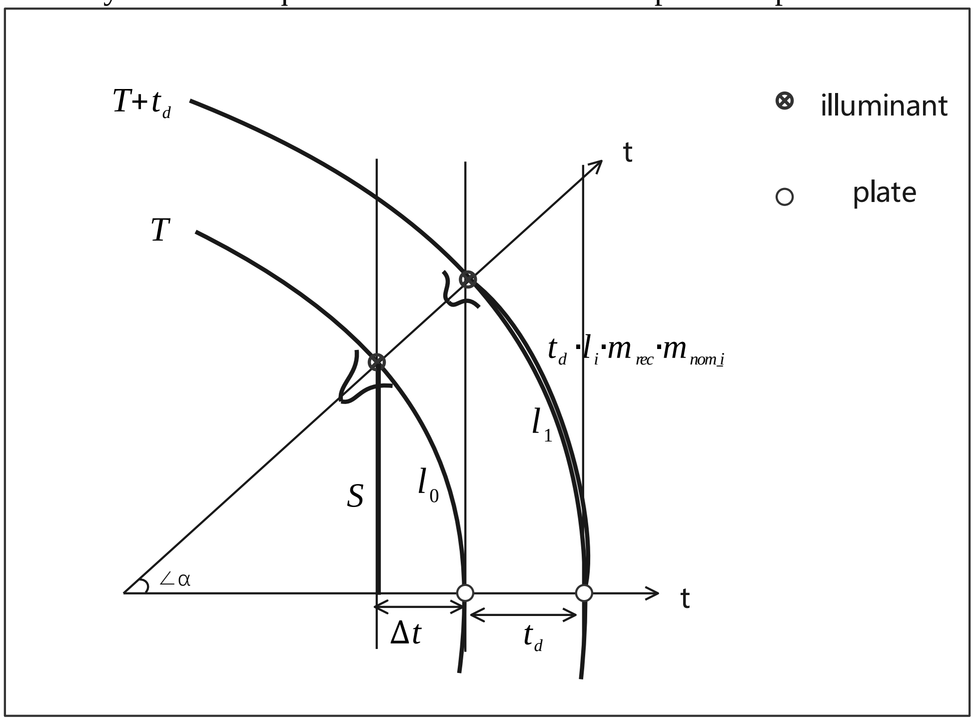


Fig. 11. The measured speed of light

F. Redshift and blueshift phenomenon

The conversion of mass into space takes various forms, appearing as light with different wavelengths. In Fig.12, wavelengths gradually decrease from left to right. Represented by vectors, shorter wavelengths correspond to smaller angles with the relative direction and higher energy.

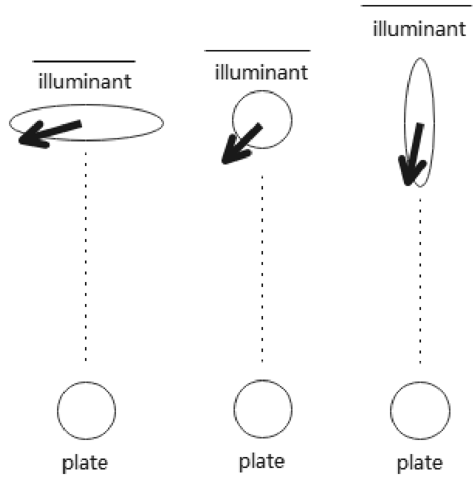


Fig. 12. Light of different wavelengths

Fig.13 illustrates the effect of source displacement in different directions on wavelength, known as redshift and blueshift phenomena.

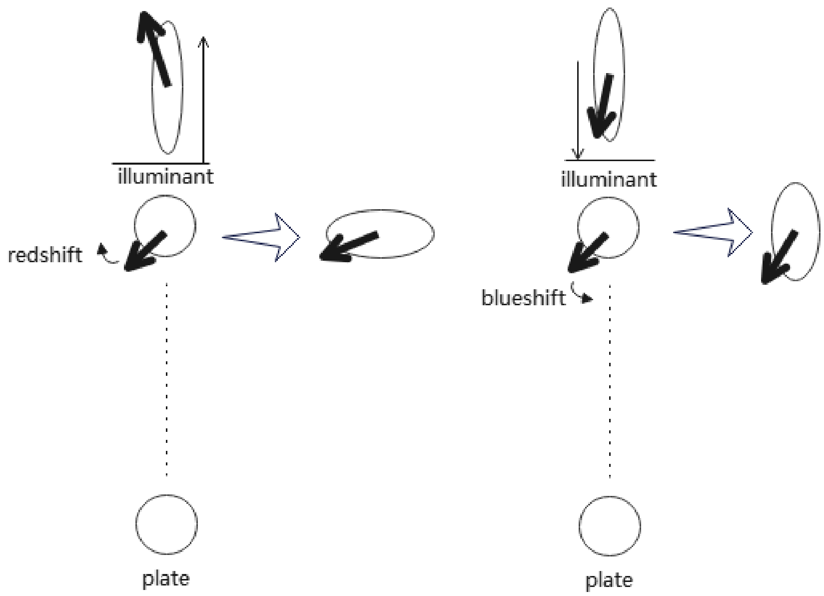


Fig. 13. Redshift and blueshift due to motion

Fig.14 shows the redshift and blueshift during expansion. The points B_0 and B_1 experience displacement due to gravitational effects, resulting in redshifts and blueshifts during expansion. Point C experiences a redshift due to interference from the opposite direction that causes displacement. Point A, despite expanding away, does not exhibit redshifts or blueshifts.

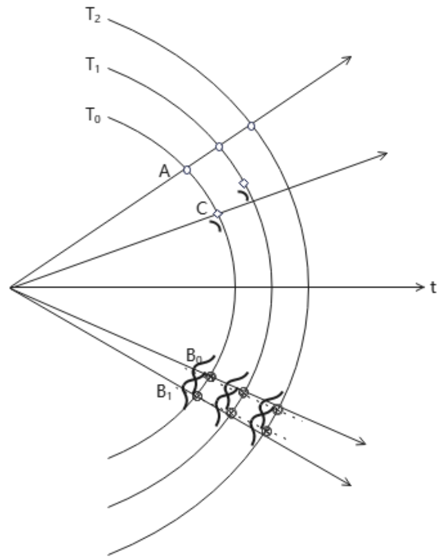


Fig. 14. Redshift and blueshift during expansion

Fig.15 and Fig.16 provide a detailed explanation of the cosmological redshift and blueshift observed.

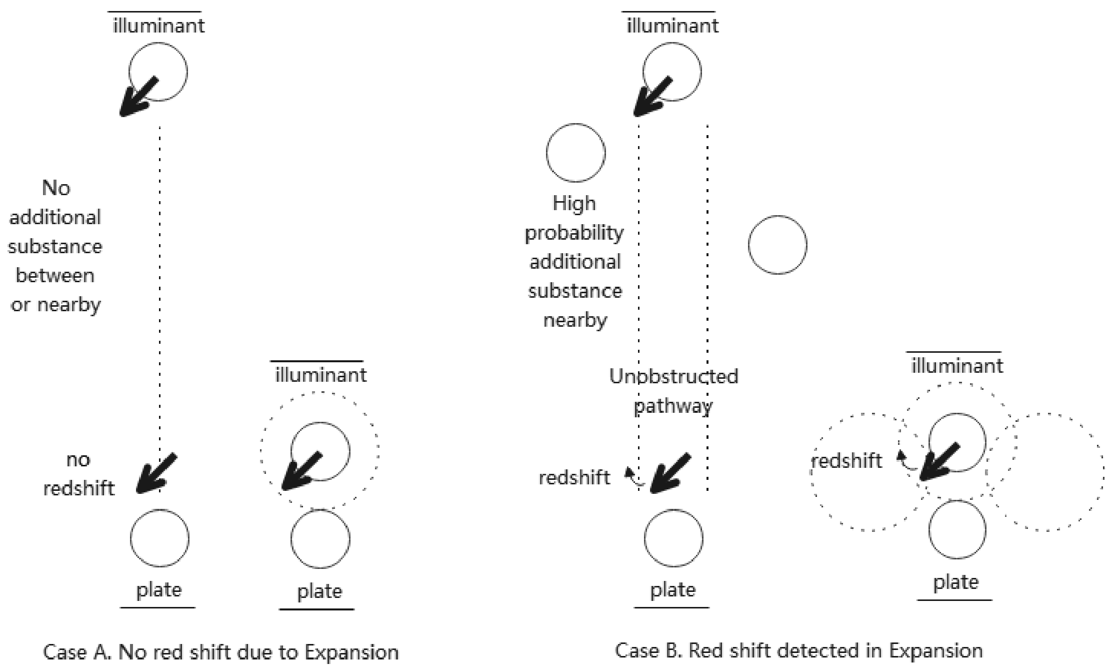


Fig. 15. Redshift and blueshift observed under high-mass density

Figure Fig.15 demonstrates two observational phenomena when spatial expansion consumption is negligible, i.e. under high-mass density conditions. In case A, pure expansion does not cause redshift or blueshift. In case B, since there is typically an unobstructed path between observed celestial bodies and observation points, additional sources likely present near this path contribute to the horizontal component of spatial expansion, equivalent to a larger angle with the relative direction, detecting redshift. The longer the path, the higher the probability of surrounding extra energy, manifested as an observed redshift positively correlated with distance.

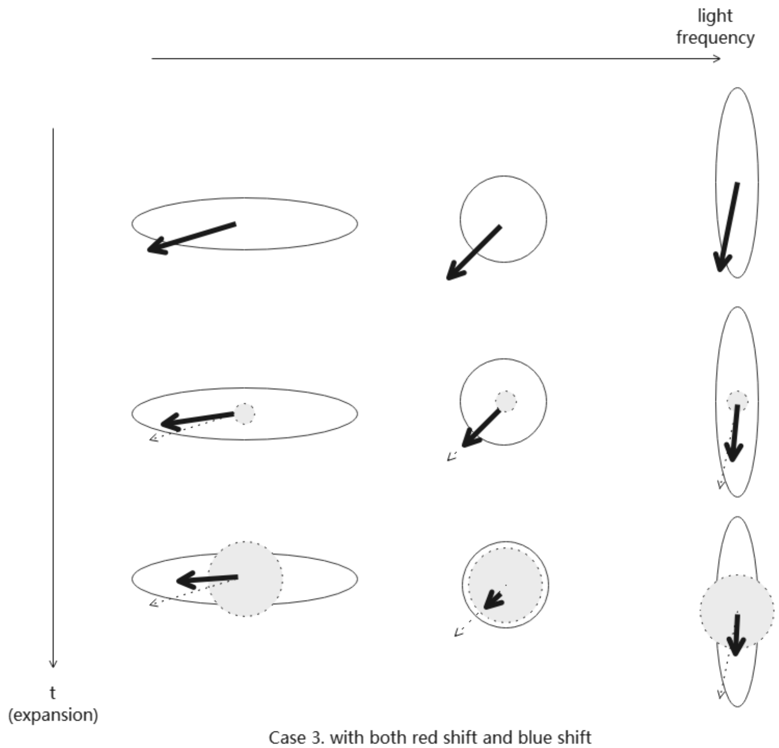


Fig. 16. Redshift and blueshift observed under low-mass density

Fig.16 illustrates observational phenomena when spatial expansion consumption cannot be neglected, i.e. under low-mass density conditions. Because different directional expansion consumption are different, the transmitted energy varies, leading to an observed reduction in intermediate wavelengths and an increase at both ends.

G. Double-slit interference phenomenon

Fig.17 explains the double-slit interference experiment. Photons received by the T_2 time imaging plate are considered to be emitted at the T_0 timeline of the cognitive universe, whereas the actual universe only occurs up to the T_2 timeline. Therefore, whether observation is introduced between T_0 and T_2 or between T_1 and T_2 makes no difference; the distinction lies in whether there is observation near the T_2 timeline. Case A indicates no observation, Case B shows the observation stronger than the alteration, and Case C shows the observation weaker than the alteration. Observation alters the image rather than the light. Observation is achieved through feedback analysis, which includes applying detection, receiving feedback, and analyzing the feedback. The application of detection involves imposing a focusing disturbance on the image, which means investing in observational energy. If the observational energy is greater than the light energy, the image focuses on a point. If the observational energy is less than the light energy, the image retains more distributed characteristics.

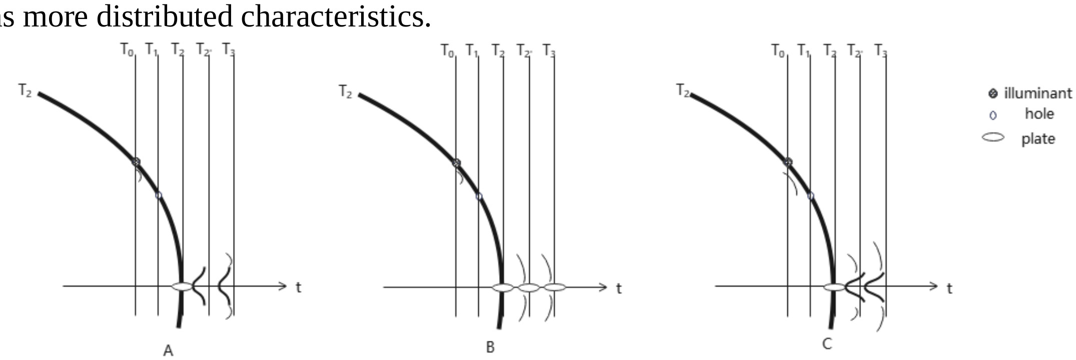


Fig. 17. The double-slit interference experiment

H. Quantum information

The transformation of explicit and implicit mass on the same timeline in the actual universe can be considered simultaneous. However, the relationship between this transformation and observational energy affects when the information can be read. Fig.18 and Fig.19 shows that quantum entanglement is a state where a pair of quantum entities remains in equilibrium with the observational energy. Because observational energy intervenes early and maintains balance, the instantaneous realization of the reading is deemed feasible. For example, in Fig.20, hunter A shoots an arrow at flying eagle B. Without any observational energy, the hunter releases the arrow at T_1, and the eagle is hit at T_{3+}. If the eagle continuously emits low-intensity observational energy, the 'hit by arrow expectation' information sent by the hunter at T_1 is read by the eagle at T_1, and then at T_{3+}, it reads the 'hit by arrow' information, which includes the information that there was no additional interference from T_1 to T_{3+}. However, if the eagle continuously emits high-intensity energy, the hunter's 'hit by arrow expectation' information will not be read, as the eagle does not believe it will be hit. If the eagle emits high intensity energy from T_1 to T_{3+}, the 'hit by arrow expectation' information is read, but the 'hit by arrow' information fails. But if the eagle misjudges the hunter's shooting energy and the observational energy is less than the information energy, the information is still successfully read. For example, if the hunter replaces the bow and arrow with a laser cannon, it can be considered that the 'hit by arrow' information is also instantaneously read. However, if the eagle is instantly killed and does not emit observational energy, the 'hit by arrow' information will become a probability due to the expansion of universe. The main difference between quantum information and non-quantum information lies in the relationship between observational energy and information energy including intensity and intervention time.

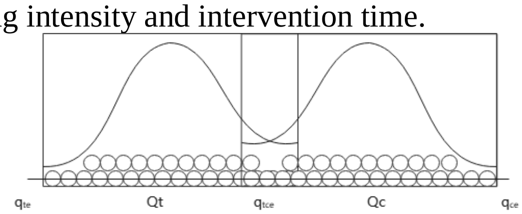


Fig. 18. Quantum entanglement

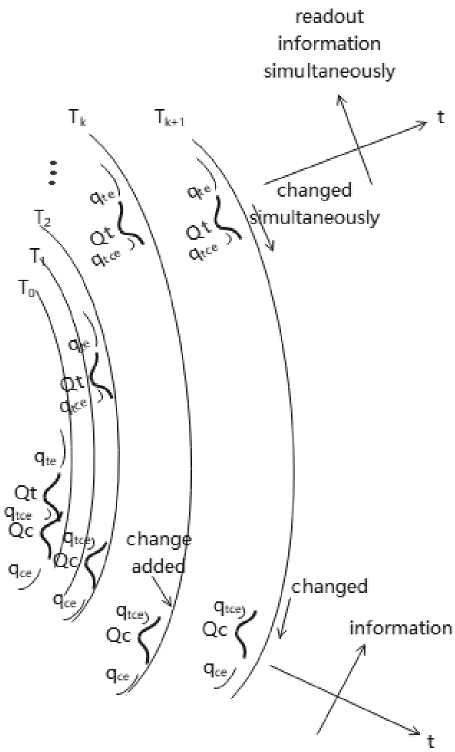


Fig. 19. Quantum Information

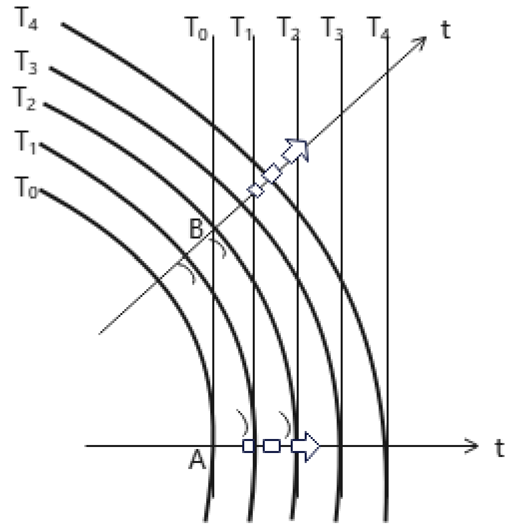


Fig. 20. Non-Quantum Information

I. Photoelectric effect[3]

In this model, light is generated by redistributing objects based on spatial expansion back to the source. In multidimensional space, a vector angle between the source and the receptor represents the wavelength.

In Fig.21, electrons are compared in a convergent equilibrium state with a spinning gyroscope, redistribution affects them only if the angle relative to the center of the gyroscope is below a certain threshold. Different metals have different equilibrium for their electrons, similar to different gyroscopes, each with unique angular or frequency thresholds. Under conditions of extreme perturbation, this threshold frequency changes.

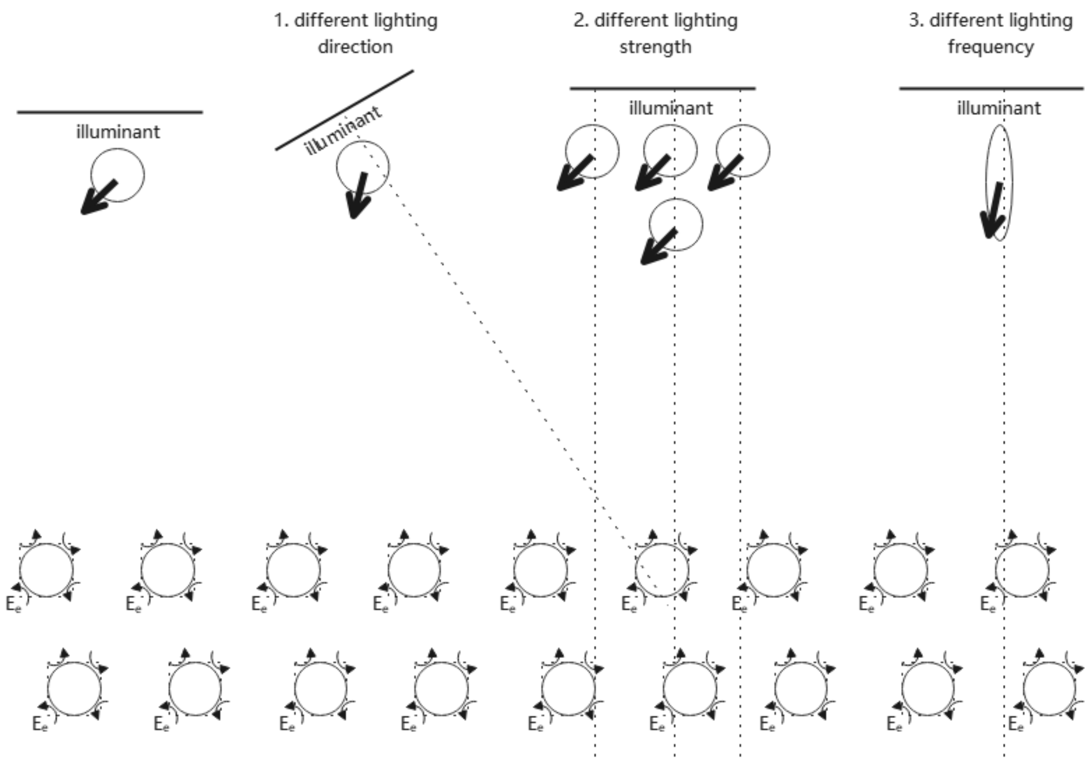


Fig. 21. Photoelectric effect — direction, intensity, and frequency of light

Fig.22 shows that the interaction of light with metal is like two piles of beads being compressed downward, creating a small peak at the edges, with the probability increasing in the opposite direction of metal density, regardless of the light's direction.

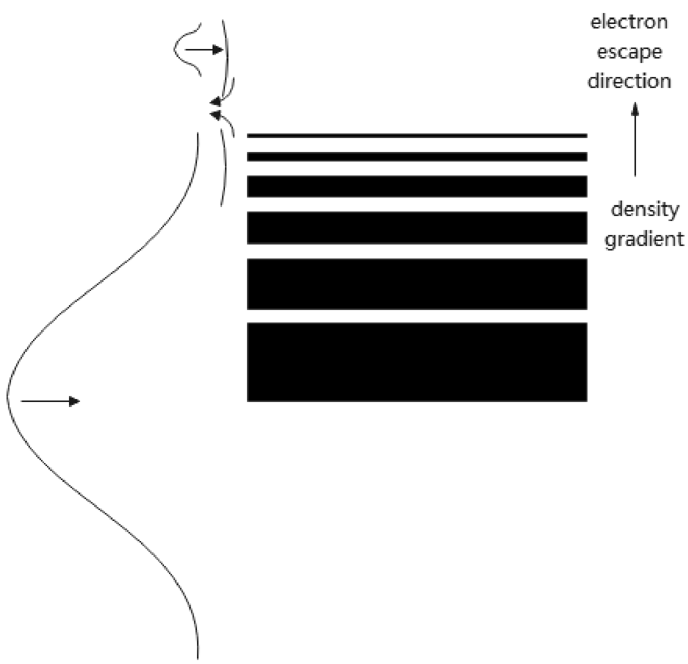
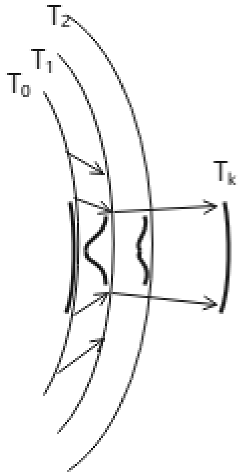


Fig. 22. Photoelectric effect — direction, intensity, and frequency of light

J. Other phenomena

Fig.23 and Fig.24 depict quantum fluctuations and repetitive cognition diagrams. Quantum fluctuations occur when the implicit mass is expelled into explicit mass and then falls back into implicit mass with expansion. Repetitive cognition tends to occur over long distances. Point B in Fig.24 is easily perceived as a massive object composed of B, B', and B''.



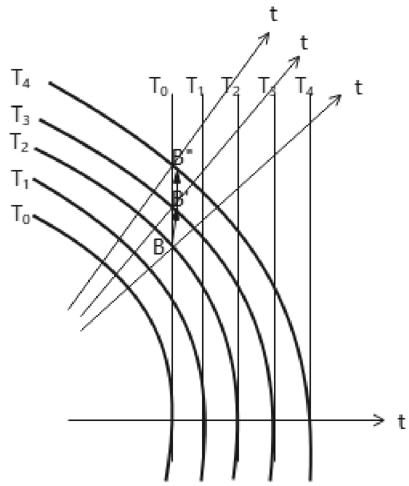


Fig. 23. Quantum fluctuation   Fig. 24. Repetitive cognition

In the actual universe, the ratio of total explicit substance to space varies over time, leading to different requirements for the expansion of space for explicit substance at different times. Consequently, physical experiments are not time-translatable along the time axis. Since the actual universe is inhomogeneous, the distribution of space expansion requirements between any two points will never be exactly the same, making physical experiments non-translatable along the spatial axis as well. This phenomenon is known as parity non-conservation.

IV. Speculations on a higher-level universe

A uniformly expanding universe can be considered to have no information change and thus does not exist as an expansion. Therefore, if there is an expanding universe, then it must be an unevenly expanding one. The actual universe with observational energy must be unevenly expanding, and the observational energy is a manifestation of consciousness. It can be said that consciousness originates from the unevenness of the universe. Just like blowing a sugar figure attempting to shape a perfect sphere, one constantly adjusts and blows because one always finds uneven spots. If we equate non-uniformity with generalized consciousness, then the existing substance inherently possesses consciousness, and the existence of consciousness inherently has substance.

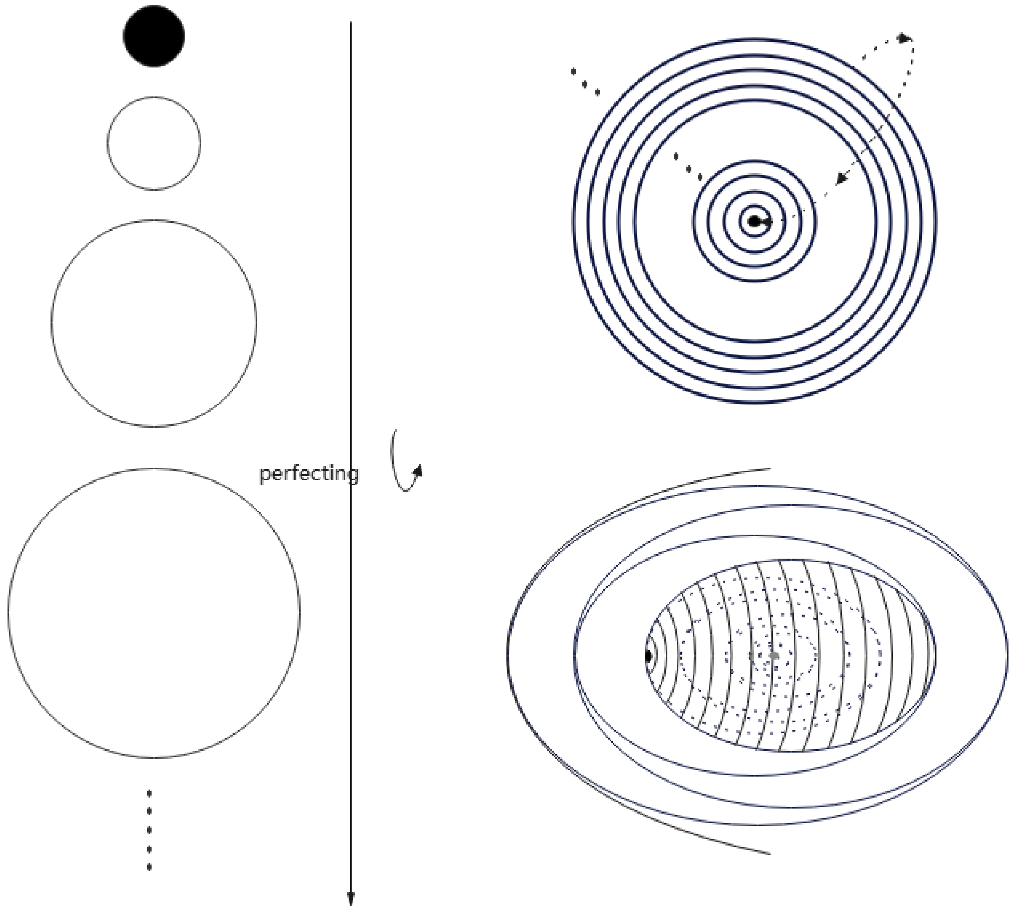


Fig. 25. Higher-level universe

Fig.25 presents a conjecture of a higher-level universe. The initial impetus of the universe is the pursuit of uniform perfection, which is referred to as the Perfecting Cosmological Model.

References and Notes

[1] E. Hubble, “A Relation between Distance and Radial Velocity among Extra-Galactic Nebulae,” The Proceedings of the National Academy of Sciences, Vol. 15, No. 3, 1929.

[2] A. Einstein, “Ist die Tr¨agheit eines K¨orpers von seinem Energieinhalt abh¨angig?” Annalen derPhysik 323 (18), 639—641 (1905). English translation as “Does the inertia of a body depend on its energy content?” in Einstein’s Miraculous Year (Princeton University Press: Princeton,1998).

[3] A. Einstein, Concerning an Heuristic Point of View Toward the Emission and Transformation of Light, Ann. Phys. 17 (1905) 132.