

# The Numbers Principles of Natural Philosophy

(Version 4)

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## Abstract

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Through the logical analysis of the numbers 0 and 1, continuously split the number 1, split to infinitesimal, a logarithmic function is established. The matter break-up and space, let their set is a logarithmic function. After the introduction of Planck length, the model of the universe is established. Conclusions are drawn from the model: Our universe opens from 1 (There is), the universe is finite,  $\max 1/(1.6 \times 10^{-35})$  meters. The whole process is: contraction  $\rightarrow$  the origin  $\rightarrow$  the universe opens  $\rightarrow$  expansion  $\rightarrow$  Big Rip, end. The dimension on cosmic original point space is invalid, and there is no external space. Direction and matter cannot be positive at the same time. We are opposite to the direction of the symmetrical universe. Infer: The break-up of matter produces space and expands the universe. There is a multiverse.

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Key words: Logarithm, Matter, Space, Planck length, Cosmic Model, Multiverse

In 1687, Newton published *The Mathematical Principles of Natural Philosophy*, he established classical mechanics with mathematics and philosophy. This paper uses numbers and philosophy to explore the nature of the universe.

## 1. Logic

0 and 1 are the origin of numbers, logical analysis of 0 and 1, as a tool and can help us explore the source of things.

### 1.1 The number 0

$$\begin{cases} 0 = 0 & (1) \\ 0 = 0+1-1+\dots\dots+0+1-1 & (2) \end{cases}$$

In equation (1), 0 has not changed, it has no significance in this paper and do not discuss. We have the number 1 In equation (2).

### 1.2 The number 1

$$\begin{cases} 1 = 1 & (3) \\ 1 = 0-1+1+1 & (4) \\ 1 = 0001/0010+0001/0010 = 0001/0100+0001/0100+0001/0100+0001/0100 \\ = \dots\dots = 1/\infty+\dots\dots +1/\infty \quad \{\mathbb{R}^+\} & (5) \end{cases}$$

In equation (3), 1 has not changed, Equations (3) and (4) can be substituted into equation (2) and is part, they don't significance in this paper. Equation (2) and (5) have changed and is meaningful.

### 1.3 The equation (5)

1.3.1 In equation (5), 1 has changed, and it changes regularly, it is meaningful.

1.3.2 Change within the range of positive real numbers. (Negative numbers are completed by "- 1").

1.3.3 The result of this number change can only be split, continuous splitting, loop down until infinitesimal.

### 1.4 Equations (2) and (5)

$$\begin{cases} 0 = 0+1-1+\dots\dots+0+1-1 & (2) \\ 1 = 0001/0010+0001/0010 = 0001/0100+0001/0100+0001/0100+0001/0100 \\ = \dots\dots = 1/\infty+\dots\dots +1/\infty \quad \{\mathbb{R}^+\} & (5) \end{cases}$$

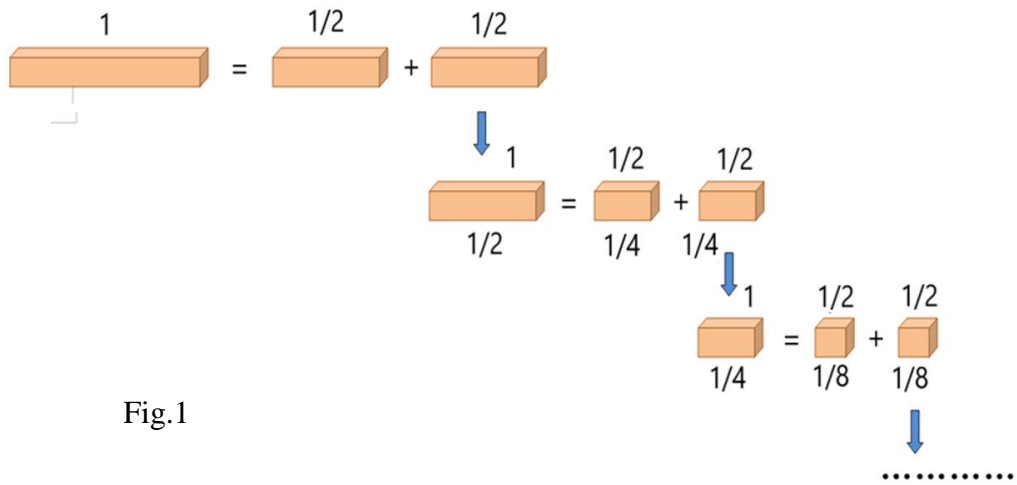
In equation(2), the number 1 is generated from 0, we have 1 that can be used; in equation(5), 1 is regularly changing, they are all meaningful.

1.4.1 Suppose there is a function  $y=f(x)$

In equation(2),  $0 = f(1)$ ;  $x = 1$ ,  $y = 0$ , it is a necessary condition of the function.

1.4.2 Equation (5) extension(Fig.1)

$$\begin{aligned}
 & 1 = 1/2+1/2 = 1/4+1/4+1/4+1/4 \\
 & 1 = 1/3+1/3+1/3 = 1/6+1/6+1/6+1/6+1/6+1/6 \\
 & 1 = 1/5+1/5+1/5+1/5+1/5 = 1/10+\dots\dots\dots+1/10 \\
 & \dots\dots\dots \\
 & \downarrow \\
 & 1/2 = 1/4+1/4 \\
 & (1+\dots+1) + (1/2+\dots+1/2) = (1/2+1/2+\dots+1/2+1/2) + (1/4+1/4+\dots+1/4+1/4) \\
 & \quad = (1/4+1/4+1/4+1/4+\dots+1/4+1/4+1/4+1/4) + (1/4+1/4+\dots+1/4+1/4) \quad (6) \\
 & 1/3 = 1/6+1/6 \\
 & (1+\dots+1) + (1/2+\dots+1/2) + (1/3+\dots+1/3) \\
 & \quad = (1/4+\dots+1/4) + (1/6+\dots+1/6) = 1/12+\dots\dots\dots+1/12 \quad (7) \\
 & \dots\dots\dots \\
 & \downarrow \\
 & (1+\dots+1) + \dots\dots\dots + (1/12+\dots+1/12) + \dots\dots\dots = 1/\infty + \dots\dots\dots + 1/\infty \quad (8)
 \end{aligned}$$



1.4.2.1 The number on the right side of the equation is constantly split, loop down to infinitesimal ( $x \rightarrow 1/\infty$ ).

1.4.2.2 Equation(6)~(8): The smaller the value split on the right the larger the sum on the left ( $x \downarrow y \uparrow$ ); when the value of the value split on the right tends to be infinitesimal, the sum on the left tends to infinity ( $x \rightarrow 1/\infty, y \rightarrow \infty$ ).

1.5 Summarize the properties of the function  $y=f(x)$ .

1.5.1 Eternity passes coordinate (1, 0),  $f(x) \Rightarrow (1, 0)$ .

1.5.2  $x \rightarrow 1/\infty, (0 < x \leq 1)$ .

1.5.3  $x \downarrow y \uparrow, (x \rightarrow 1/\infty, y \rightarrow \infty), (0 < x \leq 1, 0 \leq y < \infty)$ .

1.5.4 Conclusion: It is a logarithmic function (or exponential).

1.6 which one

$n(\log_a X), \log_a(X^n), X(\log_a X), (\log_a X)/X, (\log_a X)^{1/n}, (\log_a X)^n, (n \in \mathbb{N}^+)$

1.6.1  $y = n(\log_a X), y = \log_a(X^n)$

$y = n(\log_a X) = \log_a(X^n) = \log(a^{1/n})X$

It's just that the base of logarithm is changing, do not change the nature of  $\log_a X$ .

1.6.2  $y = X(\log_a X)$

It goes through the point (0, 0), equation (1), meaningless.

1.6.3  $y = (\log_a X)/X, Y = (\log_a X)^{1/n}$

It is in the opposite direction in "1.4.2 Equation (5) extension", do not adopt.

1.6.4  $y = (\log_a X)^n$

In equation(6)~(8), function independent variable X is addition, not multiplication, so we just take  $n=1$ .

Conclusion:  $y=\log_a X$  is the function we are looking for.

1.6.5 From equation (2) and (5) to logarithm function, dynamically aggregate the change of the number, from one-dimensional to two, there is a corresponding value in the vertical direction.

1.7 Analyze "- 1" in the same way, Derive out  $y = -\log_a(-X)$ .

According to the condition of centrosymmetric  $f(x) + f(-x) = 0$ ,

$\log_a(X) + (-\log_a(-X)) = \log_a(X) - \log_a(-(-X)) = \log_a(X) - \log_a(X) = 0$ ,

so  $y = -\log_a(-X)$  and  $y = \log_a X$  are centrosymmetric around the origin O, that is, the logarithmic function derived with the numbers 1 and -1 and they are centrosymmetric, the center of symmetry is the origin O. (Fig.2)

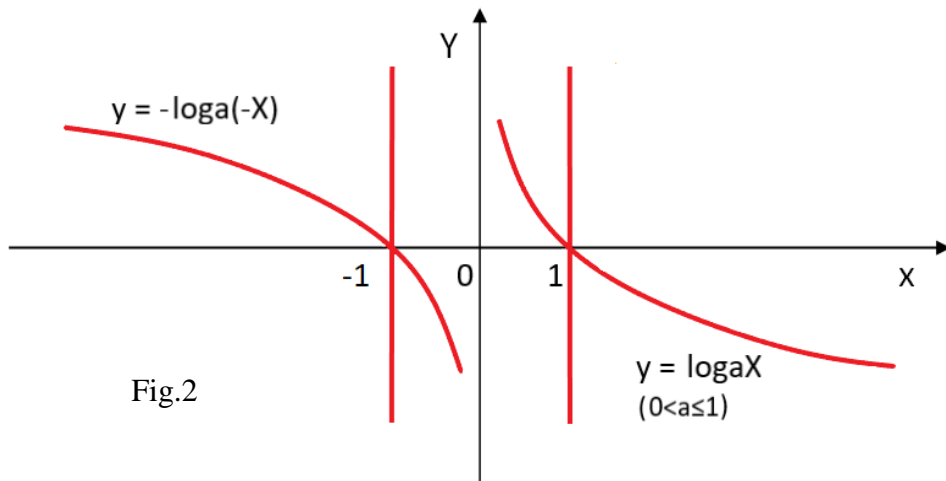


Fig.2

## 2. Physics

Mathematics has infinitesimal but there is a minimum in physics. When we introduce the Planck length, this function curve has physical properties. The Planck length is the smallest length that can be measured, and a size smaller than it doesn't make sense (Carr et al. 2005).

## 3. Cosmic model

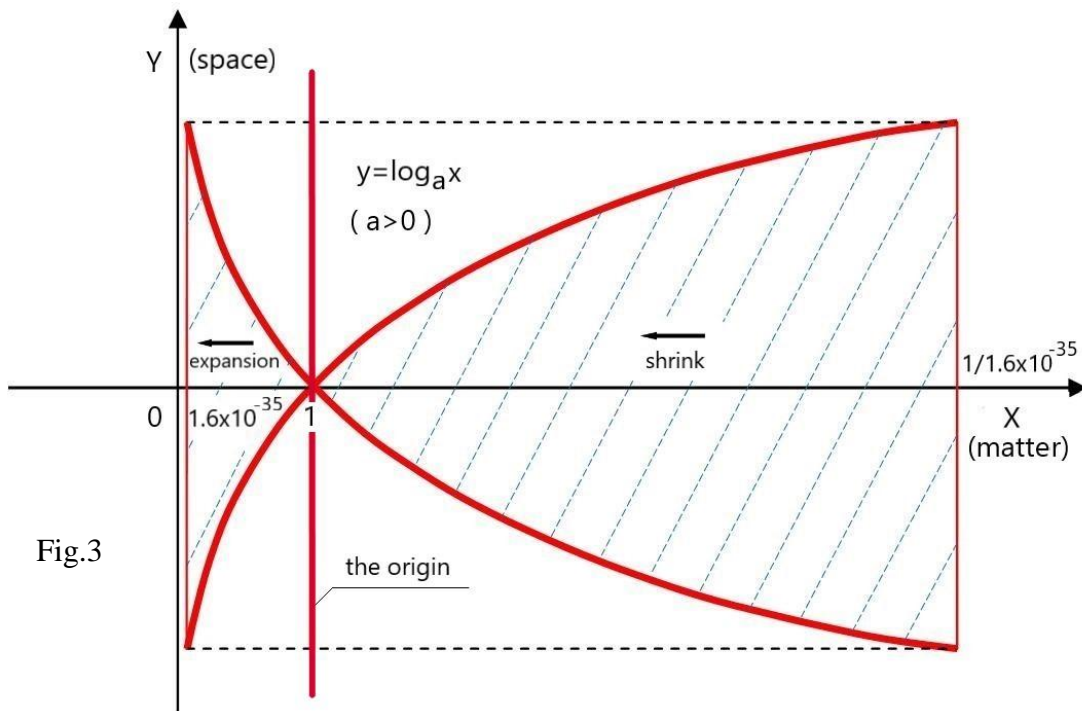


Fig.3

3.1 Let X be the matter axis and Y the spatial axis. The matter and spatial correspondence, their sets are logarithmic functions.

$Y = \log_a X$  rotates around the X axis, form a graph with a spatial volume, the ends are open.  $Y = \log(1/a)X$  and  $Y = \log_a X$  are symmetrical about the X axis, and they form the same volume of space, so they are equivalent.

3.2 When we introduce the Planck length, the ends are closed. I think the universe is limited, the maximum value is  $1/(1.6 \times 10^{-35})$  basic units, when the Planck length is introduced, its value is  $1/(1.6 \times 10^{-35})$  meter, it is the maximum diameter of the universe<sup>2</sup>.

The maximum diameter of the universe is:  $D_{\text{umax}} = 1/\ell_p$

$D_{\text{umax}}$  — The maximum diameter of the universe.

$\ell_p$  — Planck length

3.3 Figure 3 (from right to left)

The universe begins to contract from the maximum(M), gradually shrinks to the origin(P); the universe opens, the universe expands, Big Rip (Robert et al. 2003), and the universe reaches its maximum(L), end.

In theory, when matter is partition to a minimum(L) and is also the largest universe(M). At this time, the universe is flat and uniform, the density of every one cubic meter is equal, the universe is a whole and can be regarded as a huge matter.

Total space-time volume of the universe:

$$V_{\Sigma(s-t)} = \pi \int_{\ell_p}^{1/\ell_p} \log^2 a X dx \quad (a > 0, a \neq 1)$$

The volume of space-time that expands to the end after the universe opens:

$$V_{b(s-t)} = \pi \int_{\ell_p}^1 \log^2 a X dx \quad (a > 0, a \neq 1)$$

At this time,  $y = \pm 1/(2 \ell_p)$ ,  $a = \ell_p^{\pm 2} \ell^p$ . Our next step is to get the measurement data, calculate our current position in space-time and the size of the universe.

### 3.4 Cosmic original point

The dimension on this point space is invalid ( $x=1$ ), from minus infinity to plus infinity, and there is no external space<sup>3</sup>.

3.5 The 1 on the X axis should be understood as 1 basic unit.

## 4. The break-up of matter produces space

### 4.1 The break-up of volume

There is no space in cosmic original point, create space when opened. The more substances are split, the more space is created.

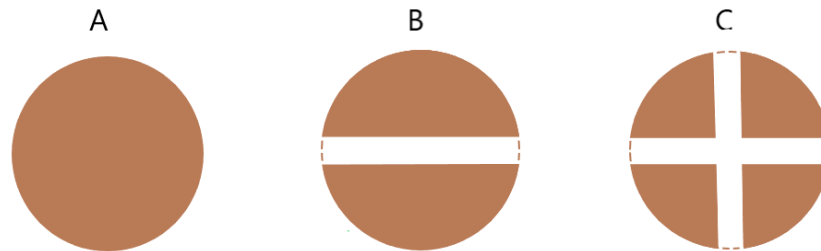


Fig.4

Three spheres, A there is no space , C space is larger than B space.

A, B, C three spheres, A there is no space, C space is larger than B space(Fig.4).

### 4.2 Radiation

Because mass–energy equivalence, energy radiation is also a kind of matter separation. The radiation is not continuous, it is emitted in waves, one by one and there is gap between them. Gaps (space) are generated by radiation waves.

#### 4.4 Formula

According to Einstein's mass-energy formula  $E = mc^2$

Derive out:  $V_w = E/\rho c^2$

$V_w$  — Space volume

$\rho$  — vacuum energy density,  $5.96 \times 10^{-27} \text{ kg/m}^3$  (Planck Collaboration 2016)

$V_w = 1.87 \times 10^9 \times E$

It is calculated that the radiated energy of 1 Joule can produce  $1.87 \times 10^9 \text{ m}^3$  space. This is an empirical value.

### 5. Hypothesis

5.1 The break-up of matter produces space; when matter releases energy, it also releases space, radiation waves cause spatial growth.

5.2 The space created by the break-up of matter expands the universe.

### 6. Multiverse

6.1 The paper established that the universe has boundaries. Then, there can also be matter outside the boundary.

6.2 There is initial singularity, the Big Bang opened the multiverse (equation (2)), our universe starts with the Planck length (equation (5)).

That is to say, the current Big Bang theory is a theory that forms a multiverse, we are the subuniverse, a successful universe.

6.3 The multiverse has various forms: expansion, contraction, stagnation, origin period, past, future, symmetrical universe, and so on (Wang 2017, pp. 147-148).

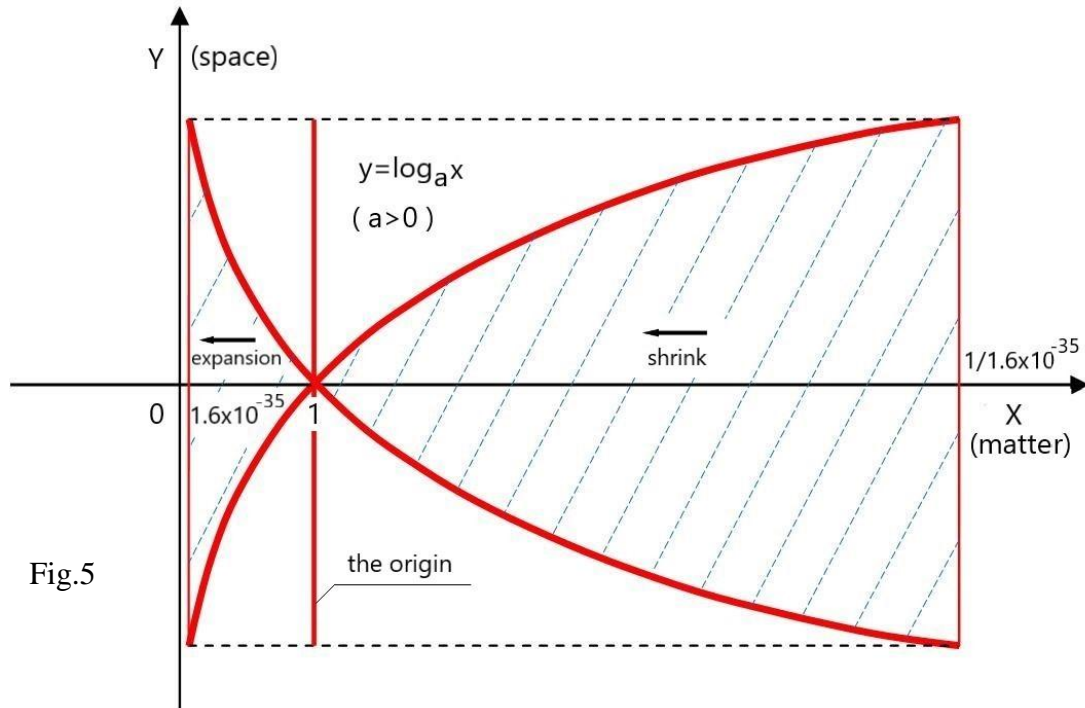
6.4 Our universe ended after destruction, the next universe has nothing to do with us.

6.5 The total mass energy of the multiverse is zero, the mass and energy of a single universe is not zero, the sum of the mass and energy of the adjacent universe (including time) can be zero.



## 7. Discuss

### 7.1 Another interpretation (Fig.5)



The expansion of the universe is also a process of contraction, the expansion we see is also shrinking, it's contracting with respect to the original point. Expansion and contraction occur simultaneously, the universe expands to the maximum and the origin shrinks to the minimum.

The origin is not one, but countless<sup>4</sup>, the size of each origin is not less than Planck length, the universe was opened from matter.

### 7.2 About dark energy

Dark energy is thought to be very homogeneous and not very dense, and is not known to interact through any of the fundamental forces other than gravity (Wikipedia 2022).

If dark energy can gravitationally interact with galaxies, We went back to classical mechanics, it is the action of force causes a body to motion and through space, this is contradictory to the retrogression speed of galaxies faster than the speed of light, violate the special theory of relativity.

The break-up of matter produces space, when matter releases energy, it also releases space, it's the space itself that is expanding and doesn't interact with other forces.

7.3 The preliminary theoretical formula (the release of energy creates space)

$$V_{\text{space}} = E\lambda^4/hc$$

$V_{\text{space}}$  — Space volume;  $E$  — Energy;  $\lambda$  — Wavelength;  $h$  — Planck constant

$c$  — Speed of light;

7.4 About 1 and 0, with and without, existence and non-existence, the relationship between them is an esoteric philosophical question. This paper thinks that they are related.

In a system where there is no time, no space, and the laws of physics fail, there are two points that can be determined: with and without; logic. Logical reasoning with 1 and 0 is an attempt.

## 8. Conclusion

8.1 Our universe opens from 1 (There is matter) Instead of 0, “-1” is separate. We live in a world of positive matter<sup>5</sup>.

8.2 Things are both origin-symmetric and axis-symmetric.

8.3 The universe is finite, maximum diameter  $1/(1.6 \times 10^{-35})$  meters.

8.4 The dimension on cosmic original point space is invalid, and there is no external space.

8.5 Direction(time) and matter cannot be positive at the same time. The direction (polarity) of the symmetrical universe is opposite to ours<sup>6</sup>(Fig.1).

8.6 The break-up of matter produces space and expands the universe.

8.7 There is a multiverse.

## Notes

1. Why constantly change? Because the universe is constantly moving, only change makes sense.
2. Compared with the maximum universe, the observable universe is equivalent to volleyball and the earth.
3. No external space and no internal space are relative.
4. Same idea as Einstein.
5. Positive and negative are relative.
6. It can be verified, if unexplained particles are found, we have to think in this respect.

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