Introduction to First Mechanics: Physics Presuppositions

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Abstract

Traditional theoretical physics typically only describes phenomena, rather than investigating mechanisms, or examines surface mechanisms without deeply investigating causes. This paper attempts to investigate the causal level of physics, to discuss a kind of First Mechanics—a foundational system that takes quantity of occupation and its substitution motion as its object of study, explaining phenomena rather than merely describing them, and constructs a corresponding formal mathematical system—in order to supplement the foundational theories of traditional physics. From this, the topic of dynamicity is discovered. Finally, from the study of Quantity of Occupation, spatial dimensionality is discovered, and from spatial dimensionality and unknown phenomena, the Unsolvability Principle is discovered: namely, that we are uncertain about everything. After the main text, a hypothesis explaining dynamicity is appended.

Keywords: quantity of occupation, conservation, dynamicity, dimensionality, unsolvability

Ⅰ. Prologue

Classical mechanics focuses more on describing phenomena when discussing motion, and discusses the causes of motion relatively superficially. For example, $F = ma$ describes that force produces acceleration, but does not define force or acceleration, let alone define motion. “Action” is only a phenomenon—so why this phenomenon and not another? “Acceleration” is only a change in velocity—so why this kind of change and not another? Therefore, traditional physics skips over many more fundamental issues, not treating them as objects of inquiry.

This is not to say that the causes of motion can be found, but rather that “discussing the causes of motion” can be done. That is, anyone trying to find a nature prior to phenomena will find it very difficult; what we demand is not an answer, but an attempt in this direction. So, although motivated by dissatisfaction with “describing phenomena” and wanting to pursue “explaining phenomena,” ultimately, because of the difficulty of the topic, it will only be “describing phenomena” one or two steps deeper than “describing phenomena”—discussing the causes of motion regardless of outcome, studying the genetic mechanisms of motion.

Also, because it is an abstract topic, it may lack substantive integration and experimentally verifiable predictions. Formal, theoretical, rather than operational or empirical; not serving measurement, not computational, purely descriptive, merely trying to clarify the positions that concepts such as motion, existence, mass, vacuum, force, and dimensionality ought to occupy in physical theory. Therefore, just because we must use new concepts to discuss these meta-topics does not mean we have to replace existing physical theoretical models; this is similar to how we still use atomic concepts to describe macroscopic effects caused by electromagnetic forces after we have already learned field excitation theory—after discussing the meta-issues, we return to using traditional concepts in applied fields. So this theory would not need to have practical application value in its equations in the way that Newton derived celestial orbits from $F = ma$, even if it were possible. It just proposes a

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meta-theoretical framework for consideration, asking some usually overlooked questions, such as: before “force” and “acceleration,” how should the subject of motion be understood? We attempt, starting from “spatial occupation,” to construct a formal hypothesis about the origin of motion.

Ⅱ. Occupation

To discuss motion, one must discuss the subject of motion. In classical physics, we understand that what moves is particles; in modern physics, we understand that what moves are excitations of fields. But before discussing what these subjects of motion are, they have a more fundamental identity that has been overlooked—occupation of a coordinate system.

Whatever the subject of motion actually is, and whatever better descriptions than field excitations may appear in the future, what it represents in the matter of motion is always and only a kind of spatial occupation. That is, if we imagine a thing, how could it be detached from a spatial coordinate system? For any content to appear reasonably, it must necessarily represent an occupation within a spatial coordinate system. Conversely, if something does not occupy a spatial coordinate system at all, we would not discover it in the first place.

This is particularly obvious for particles, and the same holds for field excitations—an “excitation” cannot be detached from space; space needs to leave a position for the excitation; the happening of an event requires a stage… That is, this coordinate system does not refer specifically to basic notions like spacetime coordinates, nor to complex coordinates such as spherical or Gaussian coordinates, but simply to the geometric spatial coordinate system that we must presuppose whenever we discuss “existence.” Whatever level our study of “existence” may reach, its foundation is necessarily a geometric topic.

That is, to discuss motion, we need to posit a subject of motion, and to assume such an entity, whatever it is, it is necessarily and priorly an occupation of a coordinate system; only then can we discuss what it is, such as a particle or a field excitation. Denote such “occupation” as O:

$$\begin{cases} \mathrm{O}(x) \\ \mathrm{O}(x, y) \\ \mathrm{O}(x, y, z) \end{cases}.$$

O can be regarded as a general term for area and volume as discussed in mathematics. Area is just O in two dimensions, and volume is O in three dimensions. Besides the common area and volume, there are also points and lines, namely point-occupation and line-occupation, except that usually point-occupation is just a point (itself), and line-occupation is the length of a line, so these two concepts are generally not mentioned. But we can know that the subject of motion we want to discuss is precisely this most fundamental occupation of a coordinate system. Occupation is defined as the position space leaves for an object—that is, it represents a space. The smallest unit is a coordinate point; the smallest occupation is point-occupation. Whenever we discuss any existent, we are actually discussing the space it represents; this region, occupied by it, and other objects did not enter it, represents it. But O represents the most basic collection of occupations. So when we refer to specific small occupations, denote them as o (lowercase first letter of occupation):

$$\begin{cases} \mathrm{o} \in \mathrm{O} \\ \{\mathrm{o}\} = \mathrm{O} \end{cases}.$$

This view of existence is not cumbersome, serving only for our discussion of motion. That is, we only need to theoretically describe motion; we do not need to actually know what the subject of motion is, only the "at least what" that the subject of motion represents. In other words, we only need to discuss the motion of these occupations of the coordinate system to obtain the most basic model of motion. Discussing the actual identity of the subject of motion is a more specific physical topic. Moreover, because this view of existence has very few presuppositions, it has the additional advantage of being able to serve as a property of any existent whatsoever. That is, even if a more advanced description than field excitations is discovered in the future, it must still represent an occupation within a coordinate system.

Ⅲ. Composition of Occupation

A. Composition of Occupation

Occupation is distinguished not only into sets and elements, but also into kinds. Of everything that exists as actuality, the parts we can touch are those that are occupied, namely mass-occupation; the parts without things, which are empty, are vacuum-occupation. Denote mass and vacuum as m and v (for mass and vacuum). Then mass-occupation and vacuum-occupation are

$$\begin{cases} \mathrm{O}_m \\ \mathrm{O}_v \end{cases}.$$

Consider "everything" as the sum of actual existents and residual space, namely total-occupation O_s (the sum of O):

$$\mathrm{O}_s = \mathrm{O}_m + \mathrm{O}_v.$$

O_m and O_v are both major categories of occupation, each having their own composition o_m and o_v. Generally we do not combine these unrelated minimal units, but when we sometimes need to refer to them collectively, it is as o_s:

$$\mathrm{o}_s = \mathrm{o}_m + \mathrm{o}_v.$$

This system emphasizes "no third party."

B. First Mass and First Vacuum

The m here does not refer to the mass of traditional physics that measures inertia, but rather to occupation of a coordinate system prior to the concept of "inertia"—that is, more simply, just the amount of things contained, not yet involving inertia or the like. This is First Mass of existence: it must first have occupation of space before it can have Second Mass as a measure of the magnitude of inertia. Because before "discovering inertia," one must first "know the carrier of inertia" to recognize that this carrier exhibits "inertia" in motion; and at the step of discovering the carrier, we should simultaneously discover that it is an occupation. "Occupation" is something that can be recognized even in a static picture, while "inertia" requires dynamics to be recognized.

Similarly, the "vacuum" we refer to is the most basic, most primitive "nothing whatsoever," not the false vacuum of modern physics—the ground state of a field containing fluctuations. That is, in this context, if the field ground state exists, it is also a kind of mass; what we think of as "empty" would actually all be O_m. If the "field ground state" exists and the primitive vacuum we imagine is actually entirely composed of it, then simply assume that there is no O_v:

$$\begin{cases} \mathrm{O}_s = \mathrm{O}_m \\ \mathrm{o}_s = \mathrm{o}_m \end{cases}.$$

Below, we will first assume that “vacuum” exists.

Ⅳ. QoO and M-V Substitution — First Motion

When we discuss motion, the subject of motion might seem to refer only to O_m within O_s, because “motion” usually does not describe vacuum; vacuum generally plays the role of a “stage” (but different from the stage function of the coordinate system — not the same level), allowing mass-occupation to change position. The motion of mass-occupation is constantly moving into regions occupied by vacuum, turning regions originally occupied by vacuum into regions occupied by mass, while the region where the mass-occupation existed before moving (itself) becomes a region occupied by vacuum. Therefore, the essence of “motion” is mass-vacuum substitution, a reallocation of coordinate points of QoO, an exchange phenomenon, rather than the unidirectional displacement of traditional physics.

Thus, we find that “existence” must be defined as a kind of quantity of space. If it represented “occupation” of space, that would mean it is forever fixed to these coordinate points, because “occupying a region” means directly becoming that region. Only when defined as “Quantity of Occupation” can it permit “point-switching” operations—that is, “existence” is merely a quantity of occupation of coordinate points; as long as the quantity remains unchanged, it can maintain itself anywhere, because it is not directly those coordinate points but rather a possession of quantity over those coordinate points. Therefore, we must distinguish between “occupation” and “Quantity of Occupation (QoO)”: the former is geometric position, the latter is a transferable quantity.

The essence of “changing coordinate points” is that some coordinate points change from having something to having nothing, from a state of occupation to a state of non-occupation—that is, regions originally occupied by mass become regions occupied by vacuum; conversely, regions originally occupied by vacuum become regions occupied by mass. The movement of mass-QoO is a change in the occupation status of coordinate points, while what remains unchanged is always one’s own Quantity of Occupation. Therefore, occupation is not the “existence” we want as the subject of motion; Quantity of Occupation is. In Section Ⅱ, we defined existence as “the position space leaves for an object, i.e., representing a space”; but actually, the definition of existence is “the accumulation of positions space leaves for an object, i.e., representing a quantity of space.” Denote quantity as Q; then Quantity of Occupation is

$$Q_{\mathrm{o}}.$$

If it were Q_{O}, that would refer to “the number of O,” meaning the number of major-category occupations (how many such sums there are), rather than how much the sum of occupations is. This concept is basically not used in this paper. So what we need is Quantity of Occupation Q_{o}, not quantity of quantity of occupation Q_{O}. The “point-QoO, line-QoO, area-QoO, volume-QoO” mentioned in Section Ⅰ are all Quantity of Occupation of space Q_{o} rather than occupation O:

$$\begin{cases} \mathrm{O}(x) \\ \mathrm{O}(x, y) \\ \mathrm{O}(x, y, z) \end{cases} \rightarrow \begin{cases} Q_{\mathrm{o}(x)} \\ Q_{\mathrm{o}(x, y)} \\ Q_{\mathrm{o}(x, y, z)} \end{cases}.$$

Total-QoO, mass-QoO, and vacuum-QoO are

$$\begin{cases} Q_{o_s} \\ Q_{o_m}, \\ Q_{o_v} \end{cases}$$

then we have

$$Q_{o_s} = Q_{o_m} + Q_{o_v}. \tag{1}$$

And the quantity of quantity of occupation Q_0, which we will basically not use, can be used once here:

$$\begin{aligned} &\because Q_{o_s} = Q_{o_m} + Q_{o_v} \\ &\therefore Q_0 = 2. \end{aligned}$$

If total-QoO is also regarded as a major category, then

$$Q_0 = 3.$$

It will not be mentioned afterwards.

And so-called "motion" is just mass-QoO and vacuum-QoO exchanging coordinate points, exchanging positions—mass-vacuum substitution. This is First Motion, the most fundamental motion in the universe. At the beginning we said "'motion' usually does not describe vacuum"; in fact, "motion" does describe the total-QoO that includes vacuum—mass-QoO and vacuum-QoO. We describe this basic motion:

Describe the instantaneous substitution of mass and vacuum and then integrate, to obtain all m-v substitution phenomena, namely all movements of mass-QoO into positions occupied by vacuum-QoO and movements of vacuum-QoO into positions occupied by mass-QoO. Use v for velocity, use r for position, use t for the time parameter, and use τ for the integration variable. (Because the parameter used in integration is time, so the integration variable τ represents intermediate moments, while the t at the two ends represent the upper and lower limits of integration.) The instantaneous velocity at time τ and position $r(\tau)$ is

$$v[r(\tau), \tau].$$

The object we describe is QoO. The position is r; the position of QoO is r_{Q_o}. Thus

$$v\big[r_{Q_o}(\tau), \tau\big].$$

(Because we want to describe all QoO, so we directly use Q_o without specifying mass-QoO or vacuum-QoO.) Integrating the instantaneous velocity at time τ and position $r(\tau)$ over time:

$$\int_{t_0}^{t} v\big[r_{Q_o}(\tau), \tau\big]\mathrm{d}\tau.$$

To obtain the entire trajectory of m-v substitution, i.e., the sum of the initial position and the change at each moment, we add the initial position. And the position of QoO is r_{Q_o}. The position of QoO at time t_0 (initial position) is expressed as

$$r_{Q_o}(t_0),$$

adding the initial position, we obtain the entire trajectory:

$$r_{Q_o}(t_0) + \int_{t_0}^{t} v[r_{Q_o}(\tau), \tau]\mathrm{d}\tau,$$

then the motion is a function of time/trajectory:

$$r_{Q_o}(t) = r_{Q_o}(t_0) + \int_{t_0}^{t} v[r_{Q_o}(\tau), \tau]\mathrm{d}\tau.$$

However, the independent variable t in this function is the same as the upper limit of the integral t. We change the upper limit of the integral t to t_1:

$$r_{Q_o}(t) = r_{Q_o}(t_0) + \int_{t_0}^{t_1} v[r_{Q_o}(\tau), \tau]\mathrm{d}\tau.$$

But Q_o is a single major-category QoO; if this held, it would only be the trajectory of mass-QoO or vacuum-QoO. In fact, even if it were not a single major-category QoO but total-QoO including both mass-QoO and vacuum-QoO, as long as it remains "major-category QoO," the motion expression still does not hold, because this expression describes the trajectory of a single QoO. Therefore, if we want to represent all exchanges of positions between mass-QoO and vacuum-QoO, we need to use the concept of "total-QoO" but cannot use Q_{0_s}, because this equation describes a single trajectory, whereas the motion of major-category QoO is multi-object. So we want to describe all trajectories within an expression that describes a single trajectory, to represent all exchanges of position. First, denote the minimal unit of major-category QoO as q_o. Because the description of major-category QoO already requires the use of lowercase o, so if we want to describe single QoO, we use lowercase q:

$$\begin{cases} q_{o_s} \\ q_{o_m}, \\ q_{o_v} \end{cases}$$

then use index notation i to label each single QoO q_o:

$$\begin{cases} (q_o)_i \\ r_{(q_o)_i} \end{cases}.$$

These respectively represent the i-th single QoO and the position of the i-th single QoO. The appearance of a second subscript, unlike before where it was used as a subscript of a subscript as in Q_{o_x}, is here used as a "sub-subscript" for q_o as a whole. The reason is that the subscript i here does not describe something like x (such as occupation), but rather describes the QoO itself. Similar cases will be treated the same way later. Then use set notation to represent the set of positions of single QoO,[2] to express that "there are 'many' positions of single QoO":

$$r_{(q_o)_i} \to \{r_{(q_o)_i}\},$$

and add time/independent variable t to obtain the trajectory function again:

$$\{r_{(q_o)_i}\}(t),$$

which can express the positions of many QoO at time t, i.e., multi-QoO motion:

[2] The function of the set braces is not the same as the function of the braces we usually use, so later in expressions that have set braces we may use double curly braces, not to be regarded as repetition.

$$\{r_{(q_{\mathrm{o}})_i}\}(t) = \{r_{(q_{\mathrm{o}})_i}\}(t_0) + \int_{t_0}^{t_1} v[\{r_{(q_{\mathrm{o}})_i}\}(\tau), \tau]\mathrm{d}\tau.$$

$r_{Q_{\mathrm{o}}}(t)$ is the basic motion of QoO. $\{r_{(q_{\mathrm{o}})_i}\}(t)$ is the motion of the entire universe. M-v substitution, specified down to each single QoO, is the sum of such movement trajectories. If vacuum does not exist, universal motion would be "ordinary m-field ground state m substitution," becoming a substitution among unit mass-QoO, with some mass-QoO playing the "vacuum stage" role. And because we are using the "first mass" concept, if the field ground state exists, we allow it to have rest mass; it can also be mass-QoO in non-substitution/non-motion moments. Or, if modern physics no longer recognizes "relativistic mass," then simply "allow the field ground state to have mass." What the field ground state cannot have is second rest mass/second mass.

Ⅴ. Conservation of QoO

Motion is the exchange of positions between Q_{o_m} and Q_{o_v}. Why is it like that? Why does it move in this way and not some other way? What norm restricts it to move in this way?

That motion manifests as the exchange of positions between Q_{o_m} and Q_{o_v} itself indicates one thing: Q_{o_m} and Q_{o_v} do not mutually annihilate. That is, Q_{o_m} and Q_{o_v} do not penetrate each other, because "penetration" would result in at least one moment where two single mass-QoO occupy the same coordinate region, which would reduce mass-QoO. And what we know to be the case is that the relationship between the two major categories of QoO is that they push each other apart, move around each other, seizing each other's coordinate points/positions/occupations, but not each other's value ("quantity" in Quantity of Occupation). Therefore, in Section Ⅱ we introduced occupation but did not emphasize what kind of occupation it is; now we can emphasize that occupation is a kind of hard occupation, not as described in Section Ⅱ as "this region, occupied by it, and other objects did not enter it, represents it," but rather "this region, occupied by it, and other objects 'can not' enter it, represents it." Therefore, the introduction of this conservation strengthens the theory of "occupation."

Thus, motion is as it is because the respective Quantities of Occupation within Q_{o_s} are invariant, leaving mutual displacement as their only possible motion—exchanging spatial coordinate points while each is conserved. To express that they do not penetrate each other and do not diminish each other (i.e., each is conserved), we set the change of each of these two quantities under any infinitesimal variation to zero, introducing the differential symbol d. And since "conservation" usually means "does not change with time," for simplicity we do not explicitly write the parameter t:

$$\begin{cases} \mathrm{d}Q_{\mathrm{o}_m} = 0 \\ \mathrm{d}Q_{\mathrm{o}_v} = 0 \end{cases}.$$

Putting the two differential results into a single ordered pair, combining them into one expression:

$$\left(\mathrm{d}Q_{\mathrm{o}_m}, \mathrm{d}Q_{\mathrm{o}_v}\right) = (0, 0).$$

But $\mathrm{O}_m + \mathrm{O}_v$ only says "mass-occupation and vacuum-occupation" without expressing that "mass-occupation and vacuum-occupation constitute total-occupation"—that is, $\mathrm{O}_m + \mathrm{O}_v$ is not necessarily O_s; total-occupation might have remnants beyond mass-occupation and vacuum-occupation. Then $\left(\mathrm{d}Q_{\mathrm{o}_m}, \mathrm{d}Q_{\mathrm{o}_v}\right)$ would not express the composition of occupation $\mathrm{O}_s = \mathrm{O}_m + \mathrm{O}_v$, and thus would not contain the information that "this is everything." Therefore, we want to express within "the sum of mass-occupation and vacuum-occupation" that there is nothing other than "mass-occupation and vacuum-occupation"—that is, in $\mathrm{O}_m + \mathrm{O}_v$ we express $\mathrm{O}_m + \mathrm{O}_v = \mathrm{O}_s$. So we can regard mass-occupation as the difference between total-occupation and vacuum-occupation, or regard vacuum-occupation as the difference between total-occupation and mass-occupation:

$$\begin{cases} \mathrm{O}_m = \mathrm{O}_s - \mathrm{O}_v \\ \mathrm{O}_v = \mathrm{O}_s - \mathrm{O}_m \end{cases},$$

then we have

$$\mathrm{O}_s = \mathrm{O}_m + \mathrm{O}_v = (\mathrm{O}_s - \mathrm{O}_v) + \mathrm{O}_v, \tag{2}$$

$$\mathrm{O}_s = \mathrm{O}_m + \mathrm{O}_v = \mathrm{O}_m + (\mathrm{O}_s - \mathrm{O}_m). \tag{3}$$

Taking one of them will be fine. We keep the first term O_m of $\mathrm{O}_m + \mathrm{O}_v$. In (2), vacuum-occupation appears first as a subtrahend; in (3), mass-occupation appears first as itself. Since we know mass-occupation exists before using it as material for subtraction, the latter is more comfortable logically. Either is fine; we first keep the first term O_m of $\mathrm{O}_m + \mathrm{O}_v$, which is (3). Similarly, for simplicity, if there is a plus sign in front, the parentheses can be removed directly, with the sign unchanged:

$$\mathrm{O}_m + (\mathrm{O}_s - \mathrm{O}_m) = \mathrm{O}_m + \mathrm{O}_s - \mathrm{O}_m.$$

But eliminating O_v would fail to express the existence of vacuum-occupation. To express the existence of vacuum-occupation, we regard mass-occupation as the complement of vacuum-occupation, i.e., give O_v a superscript c:

$$\mathrm{O}_m = (\mathrm{O}_v)^c,$$

then total-occupation becomes

$$\mathrm{O}_s = \mathrm{O}_m + \mathrm{O}_s - \mathrm{O}_m = \mathrm{O}_m + \mathrm{O}_s - (\mathrm{O}_v)^c,$$

and total-QoO is

$$Q_{\mathrm{o}_s} = Q_{\mathrm{o}_m} + Q_{\mathrm{o}_s} - Q_{(\mathrm{o}_v)^c}.$$

This allows us to mention all components within a single expression. Then, under the condition of expressing the composition of occupation, the conservation of each QoO is expressed as

$$\left(\mathrm{d}Q_{\mathrm{o}_m}, \mathrm{d}Q_{\mathrm{o}_v}\right) = \left[\mathrm{d}Q_{\mathrm{o}_m}, \mathrm{d}\left(Q_{\mathrm{o}_s} - Q_{(\mathrm{o}_v)^c}\right)\right] = (0, 0).$$

Simplifying:

$$\left(\mathrm{d}Q_{\mathrm{o}_m}, \mathrm{d}Q_{\mathrm{o}_s} - \mathrm{d}Q_{(\mathrm{o}_v)^c}\right) = (0, 0). \tag{4}$$

This both expresses the composition of QoO and expresses that such composition is everything, and also expresses that each QoO is conserved. This is why motion manifests as vacuum-QoO and mass-QoO pushing each other apart; m-v substitution occurs because the major categories of QoO are each conserved. At the same time, it can also explain the law of mass conservation—that is, not only are the parts within Q_{o_s} each conserved, but the "annihilation" of unit QoO within Q_{o_m} also continues to exist in other forms. Thus, motion takes its form due to conservation:

$$\left\{\left(\mathrm{d}Q_{\mathrm{o}_m}, \mathrm{d}Q_{\mathrm{o}_s} - \mathrm{d}Q_{(\mathrm{o}_v)^c}\right) = (0,0)\right\} \Rightarrow \left\{\left\{r_{(q_\mathrm{o})_i}\right\}(t) = \left\{r_{(q_\mathrm{o})_i}\right\}(t_0) + \int_{t_0}^{t_1} v\left[\left\{r_{(q_\mathrm{o})_i}\right\}(\tau), \tau\right]\mathrm{d}\tau\right\}.$$

This is a symmetric, conservation-driven view of motion. The universe is QoO, the conservation of QoO, and the motion of QoO:

$$\begin{cases} Q_{\mathrm{o}_s} = Q_{\mathrm{o}_m} + Q_{\mathrm{o}_v} \\ \left(\mathrm{d}Q_{\mathrm{o}_m}, \mathrm{d}Q_{\mathrm{o}_s} - \mathrm{d}Q_{(\mathrm{o}_v)^c}\right) = (0,0) \\ \left\{r_{(q_\mathrm{o})_i}\right\}(t) = \left\{r_{(q_\mathrm{o})_i}\right\}(t_0) + \int_{t_0}^{t_1} v\left[\left\{r_{(q_\mathrm{o})_i}\right\}(\tau), \tau\right]\mathrm{d}\tau \end{cases}.$$

Because the first equation, i.e. the description of QoO already expresses the composition of QoO, when integrating into a system of equations we do not need to compactly express the composition within the conservation equation; we can directly use dQ_{o_v}:

$$\begin{cases} Q_{\mathrm{o}_s} = Q_{\mathrm{o}_m} + Q_{\mathrm{o}_v} \\ \left(\mathrm{d}Q_{\mathrm{o}_m}, \mathrm{d}Q_{\mathrm{o}_v}\right) = (0,0) \\ \left\{r_{(q_\mathrm{o})_i}\right\}(t) = \left\{r_{(q_\mathrm{o})_i}\right\}(t_0) + \int_{t_0}^{t_1} v\left[\left\{r_{(q_\mathrm{o})_i}\right\}(\tau), \tau\right]\mathrm{d}\tau \end{cases}.$$

Also, to distinguish from the velocity v in the motion equation, the v representing vacuum is replaced with the empty-set symbol $\emptyset$ when encountering the motion equation:

$$\mathrm{o}_v \to \mathrm{o}_\emptyset,$$

$$\begin{cases} Q_{\mathrm{o}_s} = Q_{\mathrm{o}_m} + Q_{\mathrm{o}_\emptyset} \\ \left(\mathrm{d}Q_{\mathrm{o}_m}, \mathrm{d}Q_{\mathrm{o}_\emptyset}\right) = (0,0) \\ \left\{r_{(q_\mathrm{o})_i}\right\}(t) = \left\{r_{(q_\mathrm{o})_i}\right\}(t_0) + \int_{t_0}^{t_1} v\left[\left\{r_{(q_\mathrm{o})_i}\right\}(\tau), \tau\right]\mathrm{d}\tau \end{cases},$$

or change the instantaneous velocity $v\left[\left\{r_{(q_\mathrm{o})_i}\right\}(\tau), \tau\right]$ to $f\left[\left\{r_{(q_\mathrm{o})_i}\right\}(\tau), \tau\right]$. We will first use the first expression.

Ⅵ. Detour-Resistance/Entry-Resistance — First Fundamental Force

Once we understand QoO, the conservation of QoO (4), and First Motion $\left\{r_{(q_\mathrm{o})_i}\right\}(t)$, we can understand what force is and what action is.

According to the composition of QoO (1), there is nothing in space but mass-QoO and vacuum-QoO; vacuum-QoO is merely the absence of mass-QoO and does not actually exist. Therefore, the resistance encountered when mass-QoO enters a region originally occupied by vacuum-QoO can only come from itself—that is, friction between single mass-QoO and single mass-QoO, or friction within mass-QoO as a major category. The so-called "resistance encountered when vacuum-QoO enters a region originally occupied by mass-QoO" is a theoretical concept that does not exist, because vacuum cannot participate in any friction. And because of conservation (4), the major categories are each conserved; mass-QoO does not decrease, so single mass-QoO can only bypass each other rather than penetrating at the cost of reducing mass-QoO. Then the difficulty in bypassing is the most fundamental action in the universe. "Bypassing" is just the basic motion $\left\{r_{(q_\mathrm{o})_i}\right\}(t)$; denote resistance as F; then the resistance to "bypassing" is $F_{\left\{r_{(q_\mathrm{o})_i}\right\}(t)}$:

$$\begin{cases} Q_{o_s} = Q_{o_m} + Q_{o_\emptyset} \\ \left(\mathrm{d}Q_{o_m}, \mathrm{d}Q_{o_\emptyset}\right) = (0, 0) \\ \left\{r_{(q_o)_i}\right\}(t) = \left\{r_{(q_o)_i}\right\}(t_0) + \int_{t_0}^{t_1} v\left[\left\{r_{(q_o)_i}\right\}(\tau), \tau\right] \mathrm{d}\tau \end{cases} \rightarrow F_{\left\{r_{(q_o)_i}\right\}(t)}.$$

When the basic motion is the exchange of positions between two major categories of QoO, then the "friction" is the "obstruction when exchanging positions." The resistance to motion of mass-QoO is, for itself, bypassing; for vacuum-QoO, it is exchanging positions or some kind of entry (mass-QoO enters the original vacuum-QoO area). Thus, the essence of this friction/action/force is, for mass-QoO, detour-resistance; for vacuum-QoO, exchange-resistance/entry-resistance. It is essentially, within mass-QoO, the obstruction when single QoO bypass other single QoO, manifesting as difficulty in bypassing and difficulty in exchanging positions/entering. This is a First Fundamental Force/First Friction/First Action that is more fundamental than the four fundamental forces—a friction that does not arise from what we call electromagnetism, but simply from the fact that QoO actually occupies and is conserved. The four fundamental forces belong to the secondary level, Second Fundamental Forces. The subject of motion, "existence," appearing as a coordinate-system Quantity of Occupation, inherently possesses a property that can participate in friction, prior to electromagnetism.

This First Friction is a force that must be acknowledged before we recognize the four fundamental forces, because without studying the object of "force," one cannot study the "force" acting between objects; yet when studying the object of "force," one simultaneously recognizes that its existence is an occupation. The path "study object → study interactions between objects" necessarily studies only Second Fundamental Forces like the four fundamental forces. The First Fundamental Force, however, is a phenomenon arising from hard occupation/conservation that can be grasped at the very moment one studies the object itself, without needing the step of "interactions between objects occurring." Because occupation itself means other objects cannot enter, and thus encountering entails friction.[3] Hence, it is a First Friction that is theoretically grasped as having priority over the four fundamental forces. The essence of the four fundamental interactions is merely the result of particle exchange, and particle exchange is nothing but resistance co-determined by the composition of QoO, conservation of QoO, and m-v substitution:

(1) Without the composition of QoO, particles cannot exist, and it might encounter something other than "presence" and "absence".[4] But in fact there is particles and no such third party, so the composition of QoO is effective.

(2) If it were not for constantly entering regions originally occupied by vacuum, turning regions that were vacuum into regions one occupies, and continuously having such things happen, then even the speed of light would have nowhere to manifest; virtual photons could not propagate to the electromagnetic field of the exchange partner and be excited.

(3) Even if they propagated to the exchange partner, without conservation of QoO, particles do not have hard occupation of their own space; electrons would not perturb the magnetic field, and even if perturbations produced virtual photons, they would merely penetrate rather than couple—thus no "particle exchange." Moreover, without conservation of QoO, particle trajectories could be entirely

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[3] For single mass-QoO vs. single mass-QoO, friction; for vacuum-QoO vs. mass-QoO, substitution. But we are now discussing force, so we do not discuss vacuum-QoO.

[4] Even the "simultaneous presence and absence" of superposition is only the superposition of "presence" and "absence"; without the strict restriction of QoO composition, superposition would appear as "simultaneous presence and absence + a third party."

different; the speed of light they possess would not be deployed to propagate to the partner but elsewhere, because "the current trajectory/particles entering vacuum rather than penetrating other particles" is determined by conservation of QoO.

Before exchanging, particles must be a kind of "existence," and "existence" must be a geometric topic: occupation within coordinates. The coupling phenomena of particles, rendered coherent by the composition of QoO, are simply a series of resistances within m-v substitution. Traditional physics says "force produces acceleration" but does not ask "why does an object respond to force?" In fact, force is not the cause of motion; conservation is the constraint on the form of motion. "Force" is merely the obstruction encountered during motion, not the fundamental cause of motion. The true cause of motion's existence—the dynamicity of QoO.

Ⅶ. Dynamicity of QoO

Given only QoO, composition of QoO, and conservation of QoO, why must there be "motion"? Could everything composed of mass and vacuum, each conserved, not simply remain stationary? Neither occupation of space, nor one's composition, nor one's conservation explains why m-v substitution must occur. Therefore, motion is not automatic; we need to add "dynamicity" to explain it. That is, there is a distinction between dynamic and static universes, namely the moving universe and the static universe (we have not seen a static universe, but can give it a theoretical position), and our universe belongs to the moving universe, i.e., the universe that possesses dynamicity. If it were not for dynamicity, our universe would be a static universe, and a static universe would have only QoO, composition of QoO, and conservation of QoO, but no m-v substitution, i.e., no motion:

$$\begin{cases} Q_{\mathrm{o}_s} = Q_{\mathrm{o}_m} + Q_{\mathrm{o}_v} \\ \left(\mathrm{d}Q_{\mathrm{o}_m}, \mathrm{d}Q_{\mathrm{o}_v}\right) = (0, 0) \end{cases}.$$

If we do not discuss dynamicity, the universe could entirely be like this, existing as a static universe, leaving conserved QoO placed in space without any motion. That is, our original system of equations does not at all explain why motion is added; the composition and conservation of QoO only express "the subject of motion," not why these subjects move. So we also need to describe the cause of motion: precisely because our universe has dynamicity, is a moving universe, therefore m-v substitution exists.

If our universe is dynamic, we need to presuppose the cause of dynamicity—motion (m-v substitution) exists, so dynamicity needs to be presupposed; presupposing dynamicity requires presupposing a mover, i.e., the existence that initiates motion; otherwise theoretically there would be no motion. Regardless of what the mover is, first use D (the first letter of dynamics) to represent the dynamical mechanism, i.e., the mover, of the universe. "Having dynamicity" is then represented as, after the mover has acted, existing as a subscript:

$$\mathrm{D}\left(Q_{\mathrm{o}_s}\right) = \left(Q_{\mathrm{o}_s}\right)_{\mathrm{D}}.$$

As a formal description, the mover D has no constraints; it is a "theoretical free variable"—that is, we do not discuss what it is. When D becomes a subscript, it no longer represents "the mover" but rather "dynamicity." In mathematics, when operators or functions act on elements, parentheses are often used like this; but as long as there is no actual error, for simplicity we still remove the parentheses. Then the mover acting on the universe is

$$\mathrm{D}Q_{\mathrm{o}_s} = \left(Q_{\mathrm{o}_s}\right)_{\mathrm{D}}.$$

This is the mover taking effect: a universe that could have been static acquires dynamicity and becomes a moving universe. At this stage we do not need to know what the mover is or why it can make the universe acquire dynamicity; we only need to have described the mover so that the motion equation can appear. Since the existence of the mover and the mover's action on QoO can both be simplified into the expression of QoO composition, we expand Q_{o_s}, i.e., the action is applied to mass-QoO and vacuum-QoO:

$$\mathrm{D}\left(Q_{o_m}+Q_{o_v}\right)=\mathrm{D}Q_{o_m}+\mathrm{D}Q_{o_v}=\left(Q_{o_m}\right)_{\mathrm{D}}+\left(Q_{o_v}\right)_{\mathrm{D}},$$

applying the action to mass-QoO and vacuum-QoO as the universe:

$$\mathrm{D}\left[Q_{o_m}+Q_{o_s}-\left(Q_{o_v}\right)^c\right]=\mathrm{D}Q_{o_m}+\mathrm{D}Q_{o_s}-\mathrm{D}\left(Q_{o_v}\right)^c=\left(Q_{o_m}\right)_{\mathrm{D}}+\left(Q_{o_s}\right)_{\mathrm{D}}-\left[\left(Q_{o_v}\right)^c\right]_{\mathrm{D}}.$$

Thus the mover is incorporated into the expression of QoO composition. At this point, the expression of QoO composition simultaneously expresses four things: the existence of the mover, the existence of QoO, the mover's action on QoO, and the composition of QoO.

Now consider conservation. Even though the respective conservation equations of QoO include the universe and its conservation, basically describing the universe, it would be unreasonable to forcibly apply the mover D's action to them, because that would be applying action to conservation rather than to this universe. Also, as mentioned above, because conservation phenomena depend on a contrastive reference, there must be a changing referent to show that the conserved quantity does not change with some transformation (usually time translation), and the conservation of QoO requires the time t that is not explicitly shown but does exist as an independent variable to define "change," and time is produced after the mover acts. Therefore, the relationship between D and conservation phenomena is production and being produced: the former produces the latter,[5] not that D applies action to conservation. Conservation phenomena are produced by D acting on the universe. D's action applied to mass-QoO and vacuum-QoO as the universe produces the manifestation of respective conservation:

$$\left\{\mathrm{D}\left[Q_{o_m}+Q_{o_s}-\left(Q_{o_v}\right)^c\right]=\left(Q_{o_m}\right)_{\mathrm{D}}+\left(Q_{o_s}\right)_{\mathrm{D}}-\left[\left(Q_{o_v}\right)^c\right]_{\mathrm{D}}\right\}\Rightarrow\left\{\left[\mathrm{d}\left(Q_{o_m}\right)_{\mathrm{D}},\mathrm{d}\left(Q_{o_v}\right)_{\mathrm{D}}\right]=(0,0)\right\}.$$

And there are two ways to view the mover's influence on motion. One holds that the mover's action on QoO produces conservation phenomena (only phenomena, not conservation itself), and conservation determines how motion occurs (conservation as the norm that governs the mode of motion):

$$\left\{\mathrm{D}\left[Q_{o_m}+Q_{o_s}-\left(Q_{o_\emptyset}\right)^c\right]=\left(Q_{o_m}\right)_{\mathrm{D}}+\left(Q_{o_s}\right)_{\mathrm{D}}-\left[\left(Q_{o_\emptyset}\right)^c\right]_{\mathrm{D}}\right\}\Rightarrow\left\{\left[\mathrm{d}\left(Q_{o_m}\right)_{\mathrm{D}},\mathrm{d}\left(Q_{o_\emptyset}\right)_{\mathrm{D}}\right]=(0,0)\right\}$$

$$\Rightarrow\left\{\left\{r_{[(q_o)_i]_{\mathrm{D}}}\right\}(t)=\left\{r_{(q_o)_i}\right\}(t_0)+\int_{t_0}^{t_1}v\left[\left\{r_{[(q_o)_i]_{\mathrm{D}}}\right\}(\tau),\tau\right]\mathrm{d}\tau\right\}$$

(the term $\left\{r_{(q_o)_i}\right\}(t_0)$ does not have a subscript D. The state at t_0 can be said to be before the mover acts, or to be interacting with the mover, but definitely should not be said to be after the mover acts. That is, it can be written as $\left\{r_{(q_o)_i}\right\}(t_0)$ without dynamicity D, or it can be written as $\mathrm{D}\left\{r_{(q_o)_i}\right\}(t_0)$ to giving those D subscripts a source when the motion equation appears alone, but it cannot be written as

[5] Note, the mover only produces conservation phenomena. Conservation needs time caused by the mover to manifest and appear, but not produced by the mover; it is independent property of QoO.

$\{r_{[(q_o)_i]_D}\}(t_0)$ that already has dynamicity D, because once the mover has acted, it is no longer t_0; precisely because the state at t_0 has not yet been acted upon, it is acting on the state at t_0 that gives dynamicity. Thus only the term $\{r_{(q_o)_i}\}(\tau)$ within the integral and $\{r_{(q_o)_i}\}(t)$ as a function of time can have the subscript D; it indicates that what has dynamicity is the state after t_0), the second holds that the mover's action on QoO simultaneously produces conservation phenomena and motion. That is, motion is directly caused by the mover without passing through conservation; conservation merely adds a norm to restrict the mode of motion under the assumption that it "would move anyway." Thus, conservation is not prior to motion but rather co-level with motion, mutually influencing each other:

$$\left\{\mathrm{D}\left[Q_{\mathrm{o}_m} + Q_{\mathrm{o}_s} - \left(Q_{\mathrm{o}_\emptyset}\right)^c\right] = \left(Q_{\mathrm{o}_m}\right)_\mathrm{D} + \left(Q_{\mathrm{o}_s}\right)_\mathrm{D} - \left[\left(Q_{\mathrm{o}_\emptyset}\right)^c\right]_\mathrm{D}\right\}$$

$$\Rightarrow \begin{cases} \left[\mathrm{d}\left(Q_{\mathrm{o}_m}\right)_\mathrm{D}, \mathrm{d}\left(Q_{\mathrm{o}_\emptyset}\right)_\mathrm{D}\right] = (0, 0) \\ \{r_{[(q_o)_i]_D}\}(t) = \{r_{(q_o)_i}\}(t_0) + \int_{t_0}^{t_1} v\left[\{r_{[(q_o)_i]_D}\}(\tau), \tau\right]\mathrm{d}\tau \end{cases}.$$

Both views make sense. It mainly depends on how we regard motion—because when we discuss the broad concept of motion having only ever seen this kind of motion, we tend to assume that what we have seen is the most fundamental, just as we once overlooked first mass and first vacuum prior to traditional mass and traditional vacuum. In that sense, motion as normed by conservation is motion, so conservation is prior to motion—this is the first view. We could also, like discovering first mass, consider motion normed by conservation as merely one kind of motion, thereby regarding conservation as co-level with this kind of motion, even though we have only ever seen this kind. Both are reasonable.

Since these are all things happening in the universe, we can directly combine them with a system of equations; this way the order does not matter, only emphasizing "what is happening now." The things happening in the universe are these three things—or rather, the universe is these three things: the mover and the moved, the restrictions (norms) on motion, and the motion itself (the mode of motion):

$$\begin{cases} \mathrm{D}Q_{\mathrm{o}_s} = \left(Q_{\mathrm{o}_m}\right)_\mathrm{D} + \left(Q_{\mathrm{o}_\emptyset}\right)_\mathrm{D} \\ \left[\mathrm{d}\left(Q_{\mathrm{o}_m}\right)_\mathrm{D}, d\left(Q_{\mathrm{o}_\emptyset}\right)_\mathrm{D}\right] = (0, 0) \\ \{r_{[(q_o)_i]_D}\}(t) = \{r_{(q_o)_i}\}(t_0) + \int_{t_0}^{t_1} v\left[\{r_{[(q_o)_i]_D}\}(\tau), \tau\right]\mathrm{d}\tau \end{cases}.$$

Classical mechanics, in terms of genetic logic, is merely a phenomenon produced by this system of equations. This system of equations is, in genetic logic, the cause/genetics of classical mechanics:

$$\begin{cases} \mathrm{D}Q_{\mathrm{o}_s} = \left(Q_{\mathrm{o}_m}\right)_\mathrm{D} + \left(Q_{\mathrm{o}_\emptyset}\right)_\mathrm{D} \\ \left[\mathrm{d}\left(Q_{\mathrm{o}_m}\right)_\mathrm{D}, d\left(Q_{\mathrm{o}_\emptyset}\right)_\mathrm{D}\right] = (0, 0) \\ \{r_{[(q_o)_i]_D}\}(t) = \{r_{(q_o)_i}\}(t_0) + \int_{t_0}^{t_1} v\left[\{r_{[(q_o)_i]_D}\}(\tau), \tau\right]\mathrm{d}\tau \end{cases} \Rightarrow \begin{cases} F = ma \\ F = G\dfrac{m_1 m_2}{\ell^2} \\ \dots \end{cases}.$$

"In genetic logic" means that this system of equations is the theoretical cause of classical mechanics, the physical matrix—not that every part of classical mechanics is specifically derived from this system. For example, universal gravitation, theoretically, would not exist without this system: without the composition of QoO, there would be no objects that generate gravity and no objects attracted by gravity; without the mover, there would be no active gravity; without conservation, high masses like black holes would not accumulate because they would penetrate rather than staying at a point and accumulating; without the mode of motion, there would be no mode of attraction… But how this system actually produces universal gravitation remains unknown. So as mentioned earlier, this system of equations is only a relatively further description of phenomena for the universe, not an explanation of mechanisms. Also, I have replaced the r in the formula for the law of universal gravitation, which represents distance, with ℓ, a symbol sometimes used in physics for length, because our system of equations already contains an r. Also, although the m in classical mechanics refers to second mass rather than our first mass, it can be used equivalently as first mass, because we are not canceling inertia but merely holding that inertia has a more fundamental carrier; thus no symbol change is needed. In fact, most mechanical and motional events are various manifestations of $\{r_{[(q_o)_i]_D}\}(t)$, because $\{r_{[(q_o)_i]_D}\}(t)$ describes phenomena; most phenomena can be included in the description of $\{r_{[(q_o)_i]_D}\}(t)$. Rather, it is more like

$$\begin{cases} \mathrm{D}Q_{o_s} = \left(Q_{o_m}\right)_\mathrm{D} + \left(Q_{o_\emptyset}\right)_\mathrm{D} \\ \left[\mathrm{d}\left(Q_{o_m}\right)_\mathrm{D}, d\left(Q_{o_\emptyset}\right)_\mathrm{D}\right] = (0, 0) \\ \{r_{[(q_o)_i]_\mathrm{D}}\}(t) = \{r_{(q_o)_i}\}(t_0) + \int_{t_0}^{t_1} v\left[\{r_{[(q_o)_i]_\mathrm{D}}\}(\tau), \tau\right]\mathrm{d}\tau \Rightarrow \begin{cases} F = ma \\ F = G\dfrac{m_1 m_2}{\ell^2} \\ \dots \end{cases} \end{cases}.$$

Ⅷ. Dimensionality of QoO

A. Dimensionality of QoO

"Existence"—that is, the subject of motion, i.e., QoO—needs to be considered with respect to dimensionality. As we mentioned at the beginning, point-QoO, line-QoO, area-QoO, volume-QoO are respectively zero-dimensional QoO, one-dimensional QoO, two-dimensional QoO, three-dimensional QoO. "Occupation" is after all an operation on space, a possession of space; thus to study QoO necessarily requires investigating spatial dimensionality: how many dimensions this space has. If our system of equations does not discuss dimensionality, it fails to discuss the possible existence of other dimensions, and thus is not describing a complete universe.

That is, we have never confirmed whether other spatial dimensions exist; we have always lived only in three-dimensional space.[6] But once we become aware of the concept of "spatial dimension," we must assume that other spatial dimensions might exist, because just as "occupation" in a certain sense implies conservation, the concept of "spatial dimension" itself implies the scope of our perception. "Scope of perception" itself means there is the perceptible and the imperceptible.[7] That is, knowing the scope also enables us to imagine "outside the scope," i.e., other dimensions, especially higher ones. That is, either one is completely unaware of the existence of "spatial dimension," or once aware, one must address the possibility that other dimensions may exist; otherwise one is not rigorous.

[6] The time dimension of four-dimensional spacetime is not a spatial dimension; those higher spatial dimensions in theory are only hypotheses serving unconfirmed entities like string theory and Kaluza–Klein extra dimensions and so on.

[7] "There is that which we cannot perceive" does not mean "imperceptible things exist," but rather that even if that dimension does not exist, our scope of perception still exists. A device that can only capture signals in range x cannot capture signals in range non-x—this is an objective fact; it does not require signals in range non-x to actually exist, but rather that if they did exist, we could not capture them.

Therefore, since QoO necessarily concerns the number of dimensions of space, after its occupancy, composition, conservation, and dynamicity, we now begin to discuss its spatial dimensionality.

Denote the n-th dimension by the subscript $\mathrm{d}n$. If we add dimensionality to QoO, we obtain $\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n}$, $\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n}$, $\left(Q_{\mathrm{o}_v}\right)_{\mathrm{d}n}$, $\left[\left(Q_{\mathrm{o}_v}\right)^c\right]_{\mathrm{d}n}$ (only the d in the subscript refers to dimension; the non-subscript d is the differential symbol used in the conservation and motion equations), representing respectively the QoO of the n-th dimension, the mass-QoO of the n-th dimension, the vacuum-QoO of the n-th dimension, and the complement of vacuum-QoO of the n-th dimension:

$$\begin{cases} Q_{\mathrm{o}_s} \to \left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n} \\ Q_{\mathrm{o}_m} \to \left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n} \to \left[\left(Q_{\mathrm{o}_v}\right)^c\right]_{\mathrm{d}n} \\ Q_{\mathrm{o}_v} \to \left(Q_{\mathrm{o}_v}\right)_{\mathrm{d}n} \end{cases}.$$

Like point-QoO, line-QoO, area-QoO, volume-QoO are respectively $\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}0}$, $\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}1}$, $\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}2}$, $\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}3}$. Thus we obtain

$$\begin{cases} \left[Q_{\mathrm{o}_\emptyset} = Q_{\mathrm{o}_s} - \left(Q_{\mathrm{o}_\emptyset}\right)^c\right] \to \left\{\left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{d}n} = \left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n} - \left[\left(Q_{\mathrm{o}_\emptyset}\right)^c\right]_{\mathrm{d}n}\right\} \\ \begin{cases} \mathrm{D}Q_{\mathrm{o}_s} = \left(Q_{\mathrm{o}_m}\right)_{\mathrm{D}} + \left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{D}} \\ \left[\mathrm{d}\left(Q_{\mathrm{o}_m}\right)_{\mathrm{D}}, \mathrm{d}\left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{D}}\right] = (0, 0) \\ \left\{r_{[(q_\mathrm{o})_i]_\mathrm{D}}\right\}(t) = \left\{r_{(q_\mathrm{o})_i}\right\}(t_0) \\ + \int_{t_0}^{t_1} v\left[\left\{r_{[(q_\mathrm{o})_i]_\mathrm{D}}\right\}(\tau), \tau\right]\mathrm{d}\tau \end{cases} \to \begin{cases} \mathrm{D}\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n} = \left[\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n}\right]_{\mathrm{D}} + \left[\left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{d}n}\right]_{\mathrm{D}} \\ \left\{\mathrm{d}\left[\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}, \mathrm{d}\left[\left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}\right\} = (0, 0) \\ \left\{r_{\{[(q_\mathrm{o})_i]_{\mathrm{d}n}\}_\mathrm{D}}\right\}(t) = \left\{r_{[(q_\mathrm{o})_i]_{\mathrm{d}n}}\right\}(t_0) \\ + \int_{t_0}^{t_1} v\left[\left\{r_{\{[(q_\mathrm{o})_i]_{\mathrm{d}n}\}_\mathrm{D}}\right\}(\tau), \tau\right]\mathrm{d}\tau \end{cases} \end{cases}.$$

That is, the QoO that moves has spatial dimensionality, even if there are no other spatial dimensions.

B. Raiseability/Reduceability of Dimension — Dimensional Raiseability/Reduceability

If we cannot rule out the possibility that other spatial dimensions exist, then we also cannot rule out that the current QoO is not being projected or is currently projecting. That is, if there is a scope we cannot perceive, why should we think that what is before our eyes is its entirety? What is before our eyes could entirely be the projection of its complete self into our spatial dimension. We think we are moving a finger, but in fact we could be moving the entire universe—our finger could be a giant fibril structure enveloping the universe. Similarly, if there is a scope we cannot perceive, why should we think that we are not projected into lower dimensions as cross-sections? Therefore, QoO may not only have dimensionality, but may also be able to shuttle between dimensions.

We also add the concept of dimensional raising/reducing to the composition of QoO in the n-th dimension: $\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n} = \left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n} + \left(Q_{\mathrm{o}_v}\right)_{\mathrm{d}n}$. For example, take the first n-dimensional thing $\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n}$ and increase or decrease its dimension[8]:

$$\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n} \to \left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}(n+x)}.$$

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[8] When expressing the composition of occupation, I avoided using a content that has just appeared as material; but now I choose the just-appeared $\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n}$ to express the concept of raising/reducing. The reason is that "expressing raising/reducing" is describing a property of $\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n}$ itself, which is serving itself, not making $\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n}$ into material to serve some mathematical purpose—so the two are different.

Since x may be positive or negative, adding it can represent either raising or reducing the dimension. And because x may be zero, it also preserves the possibility that “there are actually no other spatial dimensions,” without asserting that other spatial dimensions exist or that “projection” definitely occurs—merely indicating that we are considering this possibility. This expresses the possible existence of n-dimensional QoO and its possible raising/reducing.

But $\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}(n+x)} = \left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n} + \left(Q_{\mathrm{o}_v}\right)_{\mathrm{d}n}$ may not hold, because if $x \neq 0$, the dimension of $\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}(n+x)}$ has already changed, and the two sides of the equals sign have different dimensions. So we need to restore its original dimension—if it has been increased or decreased, then decrease or increase it back—so that while expressing that it can raise/reduce dimensions, the equation still holds. Let $\mathcal{R}$ be a dimensional-change operator. (Calligraphic to distinguish it as an operator; it can represent “raise” or “reduce,” depending on whether the unknown x is positive or negative. If x is positive, O_s is raised, then $\mathcal{R}\mathrm{O}_s$ reduces the raised O_s back; if x is negative, O_s is reduced, then $\mathcal{R}\mathrm{O}_s$ raises the reduced O_s back. At the same time, the scope of $\mathcal{R}$ is not limited—it can also raise or reduce by zero, to handle the case where x may be zero, i.e., the possibility that there are no other spatial dimensions. No operational mathematical structure is given; it merely describes the existence of raising/reducing, form over content, leaving the mathematical properties unspecified.) Apply it to $\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}(n+x)}$:

$$\mathcal{R}\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}(n+x)}.$$

Here is another idea: although it would be more troublesome, we could also restrict x to be positive or zero, and then change the plus sign $+$ to a plus-minus sign $\pm$ to indicate “may raise or may reduce.” But we did not do that. Thus, while more conveniently expressing “may raise or may reduce,” it reflects the unified habit of this series of expressions: we put all possibilities directly into unknowns/unknown terms without using other aids (such as operation symbols). Thus this also echoes the dimensional-change operator $\mathcal{R}$, i.e., as an operator, $\mathcal{R}$ does not specify whether it raises or reduces; after acting, whether it raises or reduces depends on its scope of execution—which is an unknown. In this way, $\mathcal{R}$ is like the plus sign $+$; it is not that being a plus sign necessarily leads to a positive result (i.e., raising the dimension), so that “the application of $\mathcal{R}$ could also have a zero effect” would not be jarring, lest someone ask: “Since it’s an operator representing ‘raising/reducing dimensions,’ doesn’t it have to result in either raising or reducing/either positive or negative?”

In short, this both expresses that dimensions can be raised/reduced and maintains the equation:

$$\mathcal{R}\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}(n+x)} = \left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n} + \left(Q_{\mathrm{o}_v}\right)_{\mathrm{d}n}.$$

If we choose $\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n}$ or $\left(Q_{\mathrm{o}_v}\right)_{\mathrm{d}n}$ to express dimensional raiseability/reduceability, we can have

$$\begin{cases}\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n} = \mathcal{R}\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}(n+x)} + \left(Q_{\mathrm{o}_v}\right)_{\mathrm{d}n} \\ \left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n} = \left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n} + \mathcal{R}\left(Q_{\mathrm{o}_v}\right)_{\mathrm{d}(n+x)}\end{cases}.$$

This is QoO with added raiseable/reducible dimensionality. At this point we can say that QoO has both dimensionality and raiseability/reduceability, or we can say that QoO has raiseable/reducible dimensionality, depending on whether we think it is the QoO that raises/reduces or the number of dimensions. These are equivalent, but the latter unifies two matters into one property, "raiseable/reducible dimensionality," which is more concise.

C. Integration

Having understood dimensionality and its raiseability/reduceability, the mover's action on the n-dimensional raiseable/reducible QoO is

$$\left[\mathrm{D}Q_{\mathrm{o}_s} = \left(Q_{\mathrm{o}_m}\right)_{\mathrm{D}} + \left(Q_{\mathrm{o}_v}\right)_{\mathrm{D}}\right] \to \left\{\mathrm{D}\left[\mathcal{R}\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}(n+x)}\right] = \left[\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n}\right]_{\mathrm{D}} + \left[\left(Q_{\mathrm{o}_v}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}\right\},$$

the respective conservation equations for QoO become

$$\left\{\mathrm{d}\left(Q_{\mathrm{o}_m}\right)_{\mathrm{D}}, \mathrm{d}\left(Q_{\mathrm{o}_s}\right)_{\mathrm{D}} - \mathrm{d}\left[\left(Q_{\mathrm{o}_v}\right)^{c}\right]_{\mathrm{D}}\right\} \to \left\{\mathrm{d}\left[\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}, \mathrm{d}\left[\mathcal{R}\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}(n+x)}\right]_{\mathrm{D}} - \mathrm{d}\left\{\left[\left(Q_{\mathrm{o}_v}\right)^{c}\right]_{\mathrm{d}n}\right\}_{\mathrm{D}}\right\} = (0, 0),$$

thus the mover, composition, conservation, and dimensionality are expressed. The system is then

$$\begin{cases} \mathrm{D}Q_{\mathrm{o}_s} = \left(Q_{\mathrm{o}_m}\right)_{\mathrm{D}} + \left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{D}} \\ \left[\mathrm{d}\left(Q_{\mathrm{o}_m}\right)_{\mathrm{D}}, \mathrm{d}\left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{D}}\right] = (0, 0) \\ \left\{r_{[(q_{\mathrm{o}})_i]_{\mathrm{D}}}\right\}(t) = \left\{r_{(q_{\mathrm{o}})_i}\right\}(t_0) + \int_{t_0}^{t_1} v\left[\left\{r_{[(q_{\mathrm{o}})_i]_{\mathrm{D}}}\right\}(\tau), \tau\right]\mathrm{d}\tau \end{cases}$$

$$\to \begin{cases} \mathrm{D}\left[\mathcal{R}\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}(n+x)}\right] = \left[\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n}\right]_{\mathrm{D}} + \left[\left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{d}n}\right]_{\mathrm{D}} \\ \left\{\mathrm{d}\left[\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}, \mathrm{d}\left[\left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}\right\} = (0, 0) \\ \left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\right\}(t) = \left\{r_{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}}\right\}(t_0) + \int_{t_0}^{t_1} v\left\{\left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\right\}(\tau), \tau\right\}\mathrm{d}\tau \end{cases}.$$

The universe is basically these five things—the mover D, the mover's action, the moved Q_{O}, conservation $\mathrm{d}Q = 0$, the mode of motion $r_i(t)$. Only, usually the mover, the moved, and the action between them are written together. Because the mover is just the mover, not an equation, so it cannot enter a system of equations as an equation. Moreover, if we express the action between the mover and the moved, the expression already includes the existence of the mover and the moved. Therefore, to strictly separate these five things logically is somewhat impractical; involving the action already implies both actors. Thus the mover and the moved are usually combined into one equation.

If we strictly separate according to the five things, the mover itself cannot stand alone as an equation, but the remaining four things can become four equations:

$$\begin{cases} \mathrm{D}\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n} = \left[\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n}\right]_{\mathrm{D}} \\ \mathcal{R}\left[\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}(n+x)}\right]_{\mathrm{D}} = \left[\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n}\right]_{\mathrm{D}} + \left[\left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{d}n}\right]_{\mathrm{D}} \\ \left\{\mathrm{d}\left[\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}, \mathrm{d}\left[\left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}\right\} = (0, 0) \\ \left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\right\}(t) = \left\{r_{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}}\right\}(t_0) + \int_{t_0}^{t_1} v\left\{\left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\right\}(\tau), \tau\right\}\mathrm{d}\tau \end{cases}.$$

The first equation expresses the mover acting on the n-dimensional raiseable/reducible QoO to produce the n-dimensional raiseable/reducible QoO with dynamicity (the dynamic multi-raiseable/reducible-dimensional universe). The second equation expresses the composition of QoO and its dimensional raiseability/reduceability. (I.e., it expresses the composition of QoO that is raiseable/reducible in each dimension. This is also the composition of the universe and its raiseable/reducible dimensionality, and is one of the determinants of the mode of motion. Moreover, because dimensionality can be expressed in other equations—i.e., the subscript n exists—in fact what is expressed here is only the composition of QoO and the raiseability/reduceability of dimensions.) The third equation expresses the respective conservation of dynamic n. r. QoO (the second determinant of the mode of motion). The fourth equation expresses the motion of n. r. QoO. (The first three equations determine "the existence of motion" and "how it moves"; this equation is motion itself.)

The universe is the mover acting on the n. r. mass-QoO and vacuum-QoO (as everything) to produce respective conservation of dynamic QoO and motion. To unify into a single expression, we can start from the conservation equation and the motion equation, because the other two equations are easier to combine (the second equation—including the remaining equations—already contains the first equation, as the subscript D already reflects that the mover has acted; or the form DO_s is also relatively easy to realize), but the conservation equation and the motion equation seem to need to be mentioned independently. Thus, we integrate the conservation equation and the motion equation. Since the QoO in the motion equation is expressed as q_o, and we know that $\{(q_\mathrm{o})_i\}$ is just another expression of Q_o, if the conservation equation in the system of equations is to be merged into the motion equation, first it can be written as

$$\left\{\mathrm{d}\left[\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n}\right]_\mathrm{D},\mathrm{d}\left[\left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{d}n}\right]_\mathrm{D}\right\}\to\left\{\mathrm{d}\left[\left\{\left(q_{\mathrm{o}_m}\right)_i\right\}_{\mathrm{d}n}\right]_\mathrm{D},\mathrm{d}\left[\left\{\left(q_{\mathrm{o}_\emptyset}\right)_i\right\}_{\mathrm{d}n}\right]_\mathrm{D}\right\}=(0,0).$$

The conservation of any QoO (i.e., QoO not specifically referring to mass or vacuum) is expressed as

$$\mathrm{d}[\{(q_\mathrm{o})_i\}_{\mathrm{d}n}]_\mathrm{D}=0.$$

But if we directly replace the subscript of r with $\mathrm{d}[\{(q_\mathrm{o})_i\}_{\mathrm{d}n}]_\mathrm{D}=0$, i.e., turning it into $r_{\mathrm{d}[\{(q_\mathrm{o})_i\}_{\mathrm{d}n}]_\mathrm{D}=0}$, then r would describe conservation rather than QoO. So we change the expression so that conservation appears as a subscript of QoO:

$$\{[\{(q_\mathrm{o})_i\}_{\mathrm{d}n}]_\mathrm{D}\}_{\mathrm{d}=0},$$

then we have

$$r_{\{[\{(q_\mathrm{o})_i\}_{\mathrm{d}n}]_\mathrm{D}\}_{\mathrm{d}=0}}.$$

But in that case, as stated in Section IV, it would describe the trajectories of multi-QoO. The motion equation can only describe the trajectory of a single QoO, so we first break apart the set (note the disappearance of the braces), thus it is just the i-th single QoO $(q_\mathrm{o})_i$:

$$r_{\{\{[(q_\mathrm{o})_i]_{\mathrm{d}n}\}_\mathrm{D}\}_{\mathrm{d}=0}}.$$

and a single QoO cannot represent the respective conservation of the major categories of QoO, so we express the originally broken-apart set (expressing the existence of the major-category QoO) through the relationship between single QoO and major-category QoO:

$$r_{\{[(q_\mathrm{o})_i]_{\mathrm{d}n}\}_\mathrm{D}\in\{[(Q_\mathrm{o})_{\mathrm{d}n}]_\mathrm{D}\}_{\mathrm{d}=0}}.$$

(Major-category QoO does not participate in r, i.e., the description of a single trajectory, so Q_{o} can be used and must be used.) That is, the change in $\{[(Q_{\mathrm{o}})_{\mathrm{d}n}]_{\mathrm{D}}\}$ is zero. Expressing this in the motion equation then gives

$$\left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}\in\{[(Q_{\mathrm{o}})_{\mathrm{d}n}]_{\mathrm{D}}\}_{\mathrm{d}=0}}\right\}(t)=\left\{r_{\mathrm{D}[(q_{\mathrm{o}})_i]_{\mathrm{d}n}}\right\}(t_0)+\int_{t_0}^{t_1} v\left\{\left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\right\}(\tau),\tau\right\}\mathrm{d}\tau\,.$$

But originally we distinguished whether d represents dimension or differential by whether it is a subscript; now the differential symbol d also appears as a subscript. So we change one of them, using the first letter of "change" to represent the change:[9]

$$\left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}\in\{[(Q_{\mathrm{o}})_{\mathrm{d}n}]_{\mathrm{D}}\}_{\mathrm{c}=0}}\right\}(t)=\left\{r_{\mathrm{D}[(q_{\mathrm{o}})_i]_{\mathrm{d}n}}\right\}(t_0)+\int_{t_0}^{t_1} v\left\{\left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\right\}(\tau),\tau\right\}\mathrm{d}\tau\,.$$

Now we add the remaining equations of the system. And in our original motion equation, o does not specify mass or vacuum, because it concerns the m-v substitution of everything. If we want to express "respective" conservation, we split the o used to represent conservation into mass and vacuum. Thus:

$$\left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}\in\left\{\left\{\left[\left(Q_{\mathrm{o}m}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}\right\}_{\mathrm{c}=0}+\left\{\left[\left(Q_{\mathrm{o}\emptyset}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}\right\}_{\mathrm{c}=0}\right\}}\right\}(t)=\left\{r_{\mathrm{D}[(q_{\mathrm{o}})_i]_{\mathrm{d}n}}\right\}(t_0)+\int_{t_0}^{t_1} v\left\{\left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\right\}(\tau),\tau\right\}\mathrm{d}\tau\,.$$

To further express the composition of QoO (the conservation of Q_{o_s} is represented by the conservation of its own components, so there is no need to write it down):

$$\begin{aligned}&\left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}\in\left\{\left\{\left[\left(Q_{\mathrm{o}m}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}\right\}_{\mathrm{c}=0}+\left[\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}-\left\{\left\{\left[\left(Q_{\mathrm{o}_\emptyset}\right)^{c}\right]_{\mathrm{d}n}\right\}_{\mathrm{D}}\right\}_{\mathrm{c}=0}\right\}}\right\}(t)\\&\qquad=\left\{r_{\mathrm{D}[(q_{\mathrm{o}})_i]_{\mathrm{d}n}}\right\}(t_0)+\int_{t_0}^{t_1} v\left\{\left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\right\}(\tau),\tau\right\}\mathrm{d}\tau\,.\end{aligned}$$

Change the c that represents change to uppercase, to distinguish it from the complement symbol c:

$$\begin{aligned}&\left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}\in\left\{\left\{\left[\left(Q_{\mathrm{o}m}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}\right\}_{\mathrm{C}=0}+\left[\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}-\left\{\left\{\left[\left(Q_{\mathrm{o}_\emptyset}\right)^{c}\right]_{\mathrm{d}n}\right\}_{\mathrm{D}}\right\}_{\mathrm{C}=0}\right\}}\right\}(t)\\&\qquad=\left\{r_{\mathrm{D}[(q_{\mathrm{o}})_i]_{\mathrm{d}n}}\right\}(t_0)+\int_{t_0}^{t_1} v\left\{\left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\right\}(\tau),\tau\right\}\mathrm{d}\tau\,.\end{aligned}$$

And dimensional raiseability/reduceability. Previously, the QoO described by the motion trajectory did not distinguish between mass and vacuum; now that this distinction has been added, we can consider the following: since the objects of dimensional raising/reducing we generally discuss are mass-QoO, we first express dimensional raiseability/reduceability at the only place where Q_{o_m} appears.[10] The motion equation that describes the universe:

[9] We cannot use Δ. The symbol Δ only looks at results, not processes, and may fail to recognize a change that loops back to its starting state. Therefore, we need a method that examines each instantaneous change, as when describing motion.

[10] If it is later discovered that vacuum can also be discussed in terms of dimensional raising/reducing, we can change it to express it on Q_{o_s} instead. Currently, it is generally believed that dimensional raising/reducing of vacuum is meaningless.

$$
\left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}} \in \left\{\left\{\left[\mathcal{R}(Q_{\mathrm{o}_m})_{\mathrm{d}(n+x)}\right]_{\mathrm{D}}\right\}_{\mathrm{C}=0} + \left[(Q_{\mathrm{o}_s})_{\mathrm{d}n}\right]_{\mathrm{D}} - \left\{\left\{\left[(Q_{\mathrm{o}_\emptyset})^c\right]_{\mathrm{d}n}\right\}_{\mathrm{D}}\right\}_{\mathrm{C}=0}\right\}}\right\}(t)
$$

$$
= \left\{r_{\mathrm{D}[(q_{\mathrm{o}})_i]_{\mathrm{d}n}}\right\}(t_0) + \int_{t_0}^{t_1} v\left\{\left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\right\}(\tau), \tau\right\} \mathrm{d}\tau .
$$

D. Alternative Theory of Everything

Once we are aware of spatial dimensionality, in theory there is no “contradiction” or even any strangeness; theoretically all problems would be cheatedly solved—that is, spatial dimensionality can be a shortcut to unifying everything.

For example, “action at a distance.” Whether it is fields in classical physics like electric fields, magnetic fields, or entanglement in quantum mechanics, our point of entry should never be “distance,” but rather spatial dimensionality. Because to assume that a and b can act at a distance is to add an extra physical concept, whereas spatial dimensionality is already a content that has been grasped and can be used directly—a and b may never have had a distance at all; they could be at zero distance or even negative distance, merely contacting in a higher dimension. For example, when we stand on a two-dimensional plane, our legs pass through the two dimensions; in the two-dimensional view, there are only two separated circular cross-sections, unaware of the existence of the legs, and unaware that these two legs are actually connected at the hips. That is, any “separation” can be one in a higher dimension; “separation” is never a phenomenon we can prove; “distance” is always relative—relative to the spatial dimension in which distance is perceived, distance exists. In a more extreme case, in fact all things in the universe could be one, except that the intersection of this whole is in a higher dimension, merely projecting its branches into lower dimensions; we cannot falsify this. Without taking responsibility, we arbitrarily regard electromagnetic field interactions as non-contact actions occurring across empty space. In fact, their contact could entirely happen in higher dimensions, leading low-dimensional observers to believe that cross-sections are responding to each other across a distance.

The same holds for entanglement: it, too, could be a contact-based entanglement rather than the non-contact entanglement we assume. At most, we can only say that the cross-sections are interacting without contact, but we cannot arbitrarily assume that the cross-sections are all there is and ignore the possibility of their complete self. From this perspective, we do not even need to presuppose “non-contact action” as an extra concept at all; what has always been happening can be nothing but the ordinary contact action we know from our daily experience.

The same goes for “an object appearing in multiple places at once.” It could very well be that there is only “one object,” but the three-dimensional space we inhabit is itself folded—not just the space around us. Even a location far away, as long as it is folded over to this side in a higher dimension, would make us cross-sections of two three-dimensional spaces simultaneously—and we would appear in two places. Clearly, the folding of three-dimensional space is imperceptible within three-dimensional space itself, which then turns it into an inexplicable duplication. What we obtain are mere phenomena, whereas the mechanisms/principles reside in higher dimensions.

Similarly, the mechanisms behind counterintuitive phenomena such as superposition, wave-particle duality, observer effects, quantum tunneling, quantum fluctuations, etc., may could be completely explained in higher dimensions—that is, we cannot arbitrarily assume that because our spatial dimension lacks the conditions for them to occur, other spatial dimensions also lack the conditions for them to occur. All “counterintuitive” and “strange” phenomena are because our world lacks the conditions for them to occur; “the existence of other spatial dimensions” itself tells us that “the conditions that allow them to occur may exist.” That is, the point of dimensionality is not “we have found the answer,” but rather tells us that “there is nothing strange.” When there exists a scope external to us that we cannot perceive, we can basically push all “strangeness” onto it; it will dissolve on its own. If, knowing that other dimensions may exist, we still think that things are “strange,” that is us arbitrarily assuming that what we do not know has become known—that is, arbitrarily assuming that other dimensions cannot accomplish such things. Therefore, finding anything strange is a lack of rigor.

Thus, has gravity not been unified? It could very well be coherent; we simply have not perceived how it is coherent—that its coherence is manifested in higher dimensions does not mean it conflicts with anything. From the moment we become aware of the existence of other spatial dimensions, physics can always be a self-consistent closed loop; there may never have been any Two Small Clouds, never any problems—only the question of when we can reach other dimensions to seek confirmation. “Unknowns” can all be handed over to “other dimensions” to become “not strange,” because the fact of “existence of other dimensions” itself can handle/cancel “strangeness.”

Only when we have traversed all spatial dimensions could we confirm the first contradiction; before achieving dimensional travel, we have never confirmed any “strangeness.” That is, things are far from “we are pursuing a theory of everything”; rather, we have never proved that a theory of everything does not exist—general relativity and quantum field theory have never been incompatible; an ultimate theoretical framework could always exist. “Seeking a theory of everything” is to incautiously presuppose that our “contradictions” also hold in other dimensions. That is, before traversing all dimensions, there are no true “contradictions.” A theory of everything could always exist; there is only the question of how we obtain it. We cannot possibly make a judgment like “general relativity and quantum field theory are incompatible”; we cannot presuppose the existence of any “contradiction”—everything can be within a unified framework. Only, such a “theory of everything” does not describe anything, but rather jumps to the conclusion directly, so it is an alternative one, not the tradition wants. But the key point is that it is undeniable; if we do not acknowledge this shortcut, we are ourselves making incautious presuppositions about other dimensions.

Henceforth, I will put all “quantum mechanics” content in double quotation marks, because in fact we have never confirmed any “non-classical mechanics” content; there has never been substantive evidence requiring a separate “quantum mechanics” (evidence that could only be obtained by entering other dimensions). Thus, everything remains within classical mechanics; there is no “counterintuitiveness,” only pseudo-“counterintuitiveness” relative to our spatial dimension. And ecause there is only classical mechanics and no need to distinguish it by “classical,” there has always been only “physics.” Because of the possible existence of other spatial dimensions, physics is not allowed to have had problems—this is an alternative theory of everything: not that we unified everything, but that we simply cannot discover that physics is not unified.

Ⅸ. Unsolvability Principle — Ultimate Theory

In fact, once we become aware of spatial dimensionality, the ultimate answer of physics is necessarily “unsolvable.” There is no theory of everything, no universal system of equations, no universal equation, no QoO, no composition, no conservation, no dimension, no mover, no motion—only unsolvability.

“There exist spatial dimensions we cannot perceive” sounds unremarkable, but in fact affects everything we know from the ground up. If there exist spatial dimensions we cannot perceive, we likewise do not know whether there exist things in those dimensions that have tampered with our "reality." To think that there is no need to consider this possibility is to arbitrarily "confirm" the contents of other spatial dimensions—for example, that there are no things that affect our "known." Therefore, to be rigorous, we cannot say that we have ever confirmed any knowledge. This is the narrow Unsolvability Principle, confined to unknown spatial dimensions. The broad one:

Not only other spatial dimensions: as long as there exists any unknown, there exists no known. We need not posit unknown dimensions; we need only the existence of unknowns, and we are uncertain whether they have ever affected our "known." For example, we have never seen the interior of a black hole, so we cannot falsify that "inside the black hole there is actually a function producing the illusion of all physical laws and feeding it to us." Or, without observing Schrödinger's cat, we do not know whether the cat is now creating a perpetual motion machine/producing matter or energy from nothing. If you have never been in my room, you do not know whether there is a device in my closet feeding perceptions to all of humanity. When we do not know a thing, we naturally do not know what that thing contains; among these things we do not know, we cannot rule out the possibility that they contain functions that can affect our "known," making what we think we "know" actually not known. That is, without omniscience, we know nothing. Let knowledge be k, and the unknown be u; then

$$(\mathrm{k} \cap \mathrm{u} \neq \emptyset) \Rightarrow (\mathrm{k} \subseteq \mathrm{u}).$$

If there is something we do not know, then there is nothing we know.[11] We must know A by knowing A and its complement A^c; to confirm something, we must confirm the entire universe. If we are not omniscient from the beginning, we can never know anything thereafter. "Attaining omniscience" is also impossible, because if "omniscience" occurs not as the first step but at a later step, it is built on content that was already untrustworthy, so "inference" is invalid. And we were not omniscient from the beginning, thus, not to mention a theory of everything, any action seeking knowledge is necessarily doomed to failure, because the "ultimate theory" is the Unsolvability Principle. Or call it the second uncertainty principle.

This is the dual meaning of "First Mechanics" in this paper—"First" refers both to the priority of concepts such as QoO, its composition, conservation, motion, etc., over traditional physical concepts, and to the fact that, due to Unsolvability Principle, our most primary conclusion can only be "physics has no solution/science has no solution"—that is, physics/science cannot begin, and the ultimate answer of physics/science is "we do not know, and we will not know." Therefore, this theory is the beginning of physics and also the end of physics. The "edifice of thought" built over centuries stands on illusory shadows; we have never—and will never—determine anything. All research must assume Unsolvability Principle set aside in order to proceed. Therefore

$$\begin{cases} [(\mathrm{k} \cap \mathrm{u} \neq \emptyset) \Rightarrow (\mathrm{k} \subseteq \mathrm{u})] \Rightarrow (\neg \mathrm{k}) \\ \mathrm{k} \Rightarrow \neg[(\mathrm{k} \cap \mathrm{u} \neq \emptyset) \Rightarrow (\mathrm{k} \subseteq \mathrm{u})] \end{cases}.$$

That is, Unsolvability Principle leads to

$$\neg \left\{ \begin{array}{l} \left\{ r_{\{[(q_\mathrm{o})_i]_{\mathrm{d}n}\}_\mathrm{D} \in \left\{ \left\{ \left[\mathcal{R}(Q_{\mathrm{o}m})_{\mathrm{d}(n+x)} \right]_\mathrm{D} \right\}_{\mathrm{C}=0} + \left[(Q_{\mathrm{o}s})_{\mathrm{d}n} \right]_\mathrm{D} - \left\{ \left\{ \left[(Q_{\mathrm{o}\emptyset})^c \right]_{\mathrm{d}n} \right\}_\mathrm{D} \right\}_{\mathrm{C}=0} \right\}} \right\}(t) \\ = \left\{ r_{\mathrm{D}[(q_\mathrm{o})_i]_{\mathrm{d}n}} \right\}(t_0) + \int_{t_0}^{t_1} v \left\{ \left\{ r_{\{[(q_\mathrm{o})_i]_{\mathrm{d}n}\}_\mathrm{D}} \right\}(\tau), \tau \right\} \mathrm{d}\tau \end{array} \right\}.$$

---

[11] k is "knowledge," not "known." "There is unknown within the known" is illogical.

Let physics be p; it also leads to

$$\neg p.$$

Because the unknown exists, currently physics/science has no strictly known content; because the unknown existed from the beginning, there will never be any known content in the future.

Appendix: Hypothesis for the Mover — Cyclic Cosmology

Returning to the system of equations, first set aside Unsolvability Principle—assume

$$\neg[(k \cap u \neq \emptyset) \Rightarrow (k \subseteq u)].$$

The system of equations lacks a mover. We provide a hypothesis for the mover to fill the position of the mover equation. Because this is merely a logical-mathematical attempt, not dependent on physical experiments, it is naturally only suitable as a hypothesis that can be completely wrong; therefore it is not included in the main text, but is appended as an appendix.

A. The Relationship Between Origin and Mover

Since the universe is already dynamic, the mover cannot occur within the universe, but must occur at the initial state of the universe or before the initial state. And because the universe is already in motion as soon as it begins, and before that there is no motion we can define, theoretically the mover cannot occur before the initial state either—"before the universe" is meaningless for our study. So the only possibility is that the mover's action occurs at the beginning of the universe. Theoretically, the mover's action on the universe can neither occur after the universe begins nor before it begins; it can only occur when the universe begins.

If the mover necessarily concerns the beginning of the universe, then as long as there is a cosmological origin theory, we can basically consider it to contain the mover. Because the beginning of the universe is also the beginning of the dynamics we can define; even if the mechanism of an origin theory is unclear, the universe's motion must be initiated by it, so such an origin theory is certainly a kind of mover; even if we do not know how this origin turns the universe into the universe, we at least know that it must serve as the reason the universe can move; even if this origin is not only the origin of dynamics (i.e., it is simultaneously the origin of more things; dynamics is only one of its products, and it does not exist only for the sake of dynamics), we still know that the mover certainly belongs to it. Therefore, we need not understand the mechanism of this origin; we only need to know that this mechanism makes the universe move, and it can serve as the mover in our theory. Temporarily denote the origin of the universe as O; the relation might be

$$D \subsetneq O.$$

That is, the origin of the universe is not necessarily equal to the mover, but necessarily contains the mover. Thus, because the mover is certainly within the origin of the universe, we can directly treat the origin of the universe as the mover, even if it is somewhat wasteful. Now we need to find an origin of the universe. There are many hypotheses of origin; I also provide one:

B. Cyclic Cosmology Inferred From the Delayed-Choice Experiment

In daily life, the normal order we know is "from past to future," because time flows linearly. In "quantum mechanics experiments," there exist cases of "the present affecting the past," such as the delayed-choice experiment.[12] That is, it is known that in our world there exists both the order "past→future" and, because of those "quantum mechanics phenomena," the order "future→past" has also been proven to exist; the two opposite orders coexist. "Quantum mechanics" explains this as "superposition"—that is, the past itself is indeterminate, rather than us affecting the past. Now let us consider another conjecture:

Without presupposing complex time flows, assume that our everyday intuition is correct: there is only one direction of time, "past→future." Now let us try to make this assumption self-consistent. Denote past and future as P and F, and change as C.[13] The normal development we are familiar with is change from past to future—that is, the change is the future state minus the past state:

$$\mathrm{C} = \mathrm{F} - \mathrm{P}.$$

But, instead of using the "superposition interpretation," first assume that those "quantum mechanics phenomena" are indeed some kind of future affecting the past (though the mechanism is unclear), then reversed causation is regarded as a kind of impossible "future→past," which is past minus future:

$$\mathrm{C} = \mathrm{P} - \mathrm{F}.$$

Without considering realistic logic, this is how it looks mathematically. Thus, the universe's development/change includes at least one of these:

$$\begin{cases} \mathrm{C} = \mathrm{F}_1 - \mathrm{P} - \mathrm{F}_2 \\ \mathrm{C} = \mathrm{P}_2 - \mathrm{F} - \mathrm{P}_1 \end{cases}. \tag{5}$$

That is, if described only in words, one might not notice that this logic necessarily presupposes multiple pasts or multiple futures; but mathematical description reveals it. If the delayed-choice experiment is accepted, then at least two pasts or two futures have appeared, because the "present" that is caused by the "past" is, in "quantum mechanics," causing the "past." The structure "future affects past affects future" yields $\mathrm{F}_1 - \mathrm{P} - \mathrm{F}_2$; the structure "past affects future affects past" yields $\mathrm{P}_2 - \mathrm{F} - \mathrm{P}_1$. Since we first became aware of the everyday order $\mathrm{F} - \mathrm{P}$, the F and P in $\mathrm{F} - \mathrm{P}$ always have a subscript 1—that is, the F being subtracted from is always the first future, and the P being subtracted is always the first past. Both views are possible, we first take the first one.

One is the future we know daily as the minuend, F_1; the other is the future as subtrahend in reversed causation, F_2. That is, the past that affects our present (i.e., our future; for the past's future) is also affected by our present (future)—so there is at least a "future affects past affects future" structure. Mathematically, without presupposing multiple futures, we cannot allow those "quantum mechanics phenomena" given an already existing normal order. Mathematically, we need at least two "presents" to bear these two opposite relations.

For a single universe, whether future or past, it is illogical for multiples to appear, because the composition of one universe's time T consists of only one past and one future:

$$\mathrm{T} = \mathrm{P} + \mathrm{F}.$$

One time cannot have "two pasts" or "two futures." Thus, to handle this contradiction, we must introduce other times. The only things we know that possess time are universes, and in fact the content appearing in the delayed-choice experiment is not merely time. Thus, introducing other times means

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12 Wheeler, J. A. (1983). *Law Without Law*.

13 Same reason as in the previous section for not using Δ.

introducing other universes. And because of (5), the delayed-choice experiment makes it possible that there exist two pasts or two futures; if both past and future could be pluralized, then there could be universes before us and after us. So at least three universes need to be presupposed:

$$\mathrm{U}_1, \mathrm{U}_2, \mathrm{U}_3,$$

only after this can we have

$$\mathrm{T}_{\mathrm{U}_1}, \mathrm{T}_{\mathrm{U}_2}, \mathrm{T}_{\mathrm{U}_3}.$$

And because the delayed-choice experiments explicitly show "the present affecting the past," it means our future necessarily goes toward the past we have already walked. Hence, the next universe must be this universe. That is, theoretically, what can affect the past can only be a still-more-distant past. Since we already allow multiple pasts, the second past must be the previous universe. Thus, when we confirm that it is indeed "our present" affecting the past, it means "the present" appears in the previous universe—"the present" is that "still-more-distant past." This is the relativity of "past" and "future": the previous future is the next past; the next past is the previous future:

$$\begin{cases} \mathrm{F}_{\mathrm{U}_{n-1}} \to \mathrm{P}_{\mathrm{U}_n} \\ \mathrm{F}_{\mathrm{U}_n} \to \mathrm{P}_{\mathrm{U}_{n+1}} \end{cases}.$$

"Past" and "future" are never absolute. Thus, "quantum mechanics" forces us to acknowledge the existence of multiple "pasts"/"futures." The plurality of "past"/"future" forces us to assume a sequence of universes—that is, there actually exist "the previous universe, this universe, the next universe":

$$\mathrm{U}_0 \to \mathrm{U}_1 \to \mathrm{U}_2.$$

And "quantum mechanics" simultaneously tells us that "it is the present affecting the past," combined with the initial axiom that "what can affect x can only be x's past, only $\mathrm{C} = \mathrm{F} - \mathrm{P}$ exists," and the logic that "a single time does not permit a second past, yet the 'present-as-past' that affects the past is precisely a second past," it follows that "the present" must appear in the previous universe—and "the present" is of this universe. If the "previous universe" has the content of "this universe," and "this one" is "the previous one," then the boundaries between universes blur:

$$\mathrm{U}_0 = \mathrm{U}_1 = \mathrm{U}_2.$$

Thus, although at (5) I said "at least one of these," theoretically both cases exist. A future that can affect the past has no reason not to become a past affected by the future; a past affected by the future has no reason not to become a future affecting the past. That is, the delayed-choice experiment forces us to assume simultaneously the plurality and the identity of universes:

$$\begin{cases} \mathrm{U}_0 \to \mathrm{U}_1 \to \mathrm{U}_2 \\ \mathrm{U}_0 = \mathrm{U}_1 = \mathrm{U}_2 \end{cases}.$$

And since the universe has both plurality and identity, all of this must be a cyclic sequence:

$$\begin{cases} \mathrm{U}_0 \to \mathrm{U}_1 \to \mathrm{U}_2 \\ \mathrm{U}_0 = \mathrm{U}_1 = \mathrm{U}_2 \end{cases} \to \left\{ \left\{ r_{\{[(q_\mathrm{o})_i]_{\mathrm{d}n}\}_\mathrm{D}} \right\}(t) = \left\{ r_{\mathrm{D}\{[(q_\mathrm{o})_i]_{\mathrm{d}n}\}} \right\}(t_0) \right\}.$$

That is, the initial state and the final state in the motion equation are actually the same existence. (And note that $\left\{ r_{\{[(q_\mathrm{o})_i]_{\mathrm{d}n}\}_\mathrm{D}} \right\}(t)$ is not a time function but the final state. Here the subscript 1 of the final state/integral upper limit t is omitted because it does not encounter the time function t; it will be added back when it does.) The reason the universe moves is that everything in this universe—for example, the development of this universe, the results of m-v substitution—somehow initiate the next occurrence of this universe, and the mover is contained within this universe, or perhaps it is just everything in this universe, though we do not yet know how it causes motion.

This is what must be considered to allow “quantum mechanics phenomena”—past and future have plurality, and with identity among multiple pasts and futures, they must be the same thing cycling. Only a cyclic cosmology can permit the conclusions of the delayed-choice experiment.

Moreover, when the universe is cyclic, it must be infinitely cyclic. Because if any one of these universes affects the previous and the next, given their identity, it means every universe affects the previous and the next. Put another way, if any one of these universes is affected by the previous and the next, given their identity, it means every universe is affected by the previous and the next. Thus, the “first” universe always has a universe before it, and the “last” always has a universe after it. That is, “identity + cross-boundary behavior” equals infinite cross-boundary, infinite universes, infinite cycles. So not only are there “the previous universe, this universe, the next universe…” but also “the pre-previous universe, the next-next universe…”:

$$(\mathrm{U}_0 \rightarrow \mathrm{U}_1 \rightarrow \mathrm{U}_2) \rightarrow (\ldots \rightarrow \mathrm{U}_{-1} \rightarrow \mathrm{U}_0 \rightarrow \mathrm{U}_1 \rightarrow \mathrm{U}_2 \rightarrow \mathrm{U}_3 \rightarrow \ldots).$$

To summarize: the starting point of the universe is the end point, and the end point is the starting point, and this process occurs forever—an infinitely cyclic cosmology. Combined with $\mathrm{D} \subsetneq \mathrm{O}$, this is a kind of mover D:

$$\because \left\{\left\{r_{\{[(q_\mathrm{o})_i]_{\mathrm{d}n}\}_\mathrm{D}}\right\}(t) = \left\{r_{\mathrm{D}[(q_\mathrm{o})_i]_{\mathrm{d}n}}\right\}(t_0)\right\} \in \mathrm{O}$$
$$\therefore \mathrm{D} \in \left\{\left\{r_{\{[(q_\mathrm{o})_i]_{\mathrm{d}n}\}_\mathrm{D}}\right\}(t) = \left\{r_{\mathrm{D}[(q_\mathrm{o})_i]_{\mathrm{d}n}}\right\}(t_0)\right\}.$$

Let the past and future of universe U be denoted $\mathrm{P_U}$ and $\mathrm{F_U}$. The past $\mathrm{P}_{\mathrm{U}_n}$ of universe U_n is not a free initial condition, but is determined by the future $\mathrm{F}_{\mathrm{U}_{n-1}}$ of the previous universe U_{n-1}. Define the cross-universe mapping function as Φ:

$$\mathrm{P}_{\mathrm{U}_n} = \Phi \mathrm{F}_{\mathrm{U}_{n-1}}.$$

Similarly, the future $\mathrm{F}_{\mathrm{U}_n}$ of universe U_n determines the past $\mathrm{P}_{\mathrm{U}_{n+1}}$ of the next universe U_{n+1}:

$$\mathrm{P}_{\mathrm{U}_{n+1}} = \Phi \mathrm{F}_{\mathrm{U}_n}.$$

The key structure is obtained—a cross-universe discrete recurrence relation:

$$\begin{cases} \mathrm{F}_{\mathrm{U}_n} = \mathrm{P}_{\mathrm{U}_n} + \mathrm{C}_{\mathrm{U}_n} \\ \mathrm{P}_{\mathrm{U}_n} = \Phi \mathrm{F}_{\mathrm{U}_{n-1}} \\ \mathrm{P}_{\mathrm{U}_{n+1}} = \Phi \mathrm{F}_{\mathrm{U}_n} \end{cases}.$$

And each U in $\ldots \xrightarrow{\Phi} \mathrm{U}_{n-1} \xrightarrow{\Phi} \mathrm{U}_n \xrightarrow{\Phi} \mathrm{U}_{n+1} \xrightarrow{\Phi} \ldots$ has a time T composed of P and F:

$$\mathrm{T_U} = \mathrm{P_U} + \mathrm{F_U},$$

thus the temporal sequence is actually

$$\left(\ldots \xrightarrow{\Phi} \mathrm{T}_{\mathrm{U}_{n-1}} \xrightarrow{\Phi} \mathrm{T}_{\mathrm{U}_n} \xrightarrow{\Phi} \mathrm{T}_{\mathrm{U}_{n+1}} \xrightarrow{\Phi} \ldots\right) = \left(\ldots \xrightarrow{\Phi} \mathrm{P}_{\mathrm{U}_{n-1}} \rightarrow \mathrm{F}_{\mathrm{U}_{n-1}} \xrightarrow{\Phi} \mathrm{P}_{\mathrm{U}_n} \rightarrow \mathrm{F}_{\mathrm{U}_n} \xrightarrow{\Phi} \mathrm{P}_{\mathrm{U}_{n+1}} \rightarrow \mathrm{F}_{\mathrm{U}_{n+1}} \xrightarrow{\Phi} \ldots\right).$$

Within the same universe (i.e., under the same $\mathrm{T_U}$), $\mathrm{P} \rightarrow \mathrm{F}$ does not require the mapping function Φ; across universes, $\mathrm{P} \rightarrow \mathrm{F}$ requires Φ. And because the delayed-choice experiments explicitly show "the present affecting the past," our future must go toward the past we have already walked, hence, the next universe must be this universe. And because this universe, due to identity, simultaneously possesses "next-ness," this universe must also have its previous universe to serve as "some other universe's next." Then all $\mathrm{T_U}$ are equal:

$$\ldots = \left(\mathrm{P}_{\mathrm{U}_{n-1}} + \mathrm{F}_{\mathrm{U}_{n-1}}\right) = \left(\mathrm{P}_{\mathrm{U}_n} + \mathrm{F}_{\mathrm{U}_n}\right) = \left(\mathrm{P}_{\mathrm{U}_{n+1}} + \mathrm{F}_{\mathrm{U}_{n+1}}\right) = \ldots.$$

Thus there is actually only one universe. Only we, looking down on this sequence from above, become aware of the only difference among these cycling "universes"—the order. And this order merely reflects the process of the universe cycling through time. So in fact the subscript numbers of the universe do not exist (otherwise the equalities could not hold); "number" describes only the "n-th cycle." Use c to denote the number of cycles:

$$(\ldots \rightarrow \mathrm{U}_1 \rightarrow \mathrm{U}_2 \rightarrow \mathrm{U}_3 \ldots) \rightarrow (\ldots \rightarrow \mathrm{U}_{c1} \rightarrow \mathrm{U}_{c2} \rightarrow \mathrm{U}_{c3} \ldots).$$

Thus, when we say "infinite cycle," it is actually a modular closed cycle, and due to identity, the cycle has only one phase. Hence, this cosmic cycle is both an infinite cycle and the most finite finite cycle (only one phase). In fact, the cosmic cycle is the largest kind of cycle; strictly speaking, it has no carrier or externality, so phases cannot be defined; to say there is "one" is already imprecise. It can be seen as "the infinity is the cycle itself," or as a "infinite finite cycle"—thus "modular cycle" is a better term, allowing both finite and infinite cycles. In any case, n no longer denotes a universe number but the number of cycles. If we really need to distinguish universes, we can only distinguish by the number of cycles, e.g., the universe in the n-th cycle and the universe in the $n+1$-th cycle:

$$\begin{cases} \mathrm{U}_{c1} \\ \mathrm{U}_{c2} \\ \mathrm{U}_{c3} \\ \vdots \end{cases}.$$

But there is no difference between them. Thus

$$\begin{cases} \mathrm{F}_{\mathrm{U}_n} = \mathrm{P}_{\mathrm{U}_n} + \mathrm{C}_{\mathrm{U}_n} \\ \mathrm{P}_{\mathrm{U}_n} = \Phi \mathrm{F}_{\mathrm{U}_{n-1}} \\ \mathrm{P}_{\mathrm{U}_{n+1}} = \Phi \mathrm{F}_{\mathrm{U}_n} \end{cases} \rightarrow \begin{cases} \mathrm{F}_{\mathrm{U}_{cn}} = \mathrm{P}_{\mathrm{U}_{cn}} + \mathrm{C}_{\mathrm{U}_{cn}} \\ \mathrm{P}_{\mathrm{U}_{cn}} = \Phi \mathrm{F}_{\mathrm{U}_{c(n-1)}} \\ \mathrm{P}_{\mathrm{U}_{c(n+1)}} = \Phi \mathrm{F}_{\mathrm{U}_{cn}} \end{cases}.$$

The "past" of the universe U_{cn} in the n-th cycle is determined by the "future" $\mathrm{F}_{\mathrm{U}_{c(n-1)}}$ of the universe $\mathrm{U}_{c(n-1)}$ in the $n-1$-th cycle, through a coupling Φ. This looks causally reversed, but in fact within each cycle it remains $\mathrm{F}-\mathrm{P}$; the supposedly impossible $\mathrm{P}-\mathrm{F}$ never actually occurs. The so-called "future affecting the past" is merely because the future of $\mathrm{U}_{c(n-1)}$ is, for the past of U_{cn}, also a kind of past:

$$\mathrm{F}_{\mathrm{U}_{c(n-1)}} \in \mathrm{P}.$$

What is more past than the past becomes the past of that past, and that past becomes its future; everything is relative. In this sequence, all that ever happens in this universe is $\mathrm{F}-\mathrm{P}$. Hence, the sequence we originally imagined is actually

$$\left[\dots \xrightarrow{\Phi} \mathrm{P}_{\mathrm{U}_{\mathrm{c}(n-1)}} \to \mathrm{F}_{\mathrm{U}_{\mathrm{c}(n-1)}} \xrightarrow{\Phi} \mathrm{P}_{\mathrm{U}_{\mathrm{c}n}} \to \mathrm{F}_{\mathrm{U}_{\mathrm{c}n}} \xrightarrow{\Phi} \mathrm{P}_{\mathrm{U}_{\mathrm{c}(n+1)}} \to \mathrm{F}_{\mathrm{U}_{\mathrm{c}(n+1)}} \xrightarrow{\Phi} \dots\right]$$

$$\to (\dots\mathrm{P} \to \mathrm{P} \to \mathrm{P} \to \mathrm{P} \to \mathrm{P} \to \mathrm{F} \to \dots)$$

Only the very last one is F; all previous Fs are only F relative to the P before them. The reason for all this is that the universe is cyclic (and from the order of derivation, we arrive at cyclic cosmology by discovering the recurrence relation, so we can use double arrow):

$$\left\{\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\}(t) = \{r_{\mathrm{D}[(q_{\mathrm{o}})_i]_{\mathrm{d}n}}\}(t_0)\right\} \Leftrightarrow \begin{cases} \mathrm{F}_{\mathrm{U}_{\mathrm{c}n}} = \mathrm{P}_{\mathrm{U}_{\mathrm{c}n}} + \mathrm{C}_{\mathrm{U}_{\mathrm{c}n}} \\ \mathrm{P}_{\mathrm{U}_{\mathrm{c}n}} = \Phi \mathrm{F}_{\mathrm{U}_{\mathrm{c}(n-1)}} \\ \mathrm{P}_{\mathrm{U}_{\mathrm{c}(n+1)}} = \Phi \mathrm{F}_{\mathrm{U}_{\mathrm{c}n}} \end{cases}.$$

C. Integration

Now, the position of the missing "mover" in the system of equations might be filled by this cyclic equation (and when $\{r_{\mathrm{D}[(q_{\mathrm{o}})_i]_{\mathrm{d}n}}\}(t_0)$ in the mover equation represents the effect of D on QoO, $\mathrm{D}(Q_{\mathrm{o}_s})_{\mathrm{d}n} = \left[(Q_{\mathrm{o}_s})_{\mathrm{d}n}\right]_{\mathrm{D}}$ is actually no longer needed):

$$\begin{cases} \mathrm{D}(Q_{\mathrm{o}_s})_{\mathrm{d}n} = \left[(Q_{\mathrm{o}_s})_{\mathrm{d}n}\right]_{\mathrm{D}} \\ \mathcal{R}\left[(Q_{\mathrm{o}_s})_{\mathrm{d}(n+x)}\right]_{\mathrm{D}} = \left[(Q_{\mathrm{o}_m})_{\mathrm{d}n}\right]_{\mathrm{D}} + \left[(Q_{\mathrm{o}_\emptyset})_{\mathrm{d}n}\right]_{\mathrm{D}} \\ \left\{\mathrm{d}\left[(Q_{\mathrm{o}_m})_{\mathrm{d}n}\right]_{\mathrm{D}}, \mathrm{d}\left[(Q_{\mathrm{o}_\emptyset})_{\mathrm{d}n}\right]_{\mathrm{D}}\right\} = (0,0) \\ \{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\}(t) = \{r_{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}}\}(t_0) + \int_{t_0}^{t_1} v\left\{\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\}(\tau), \tau\right\} \mathrm{d}\tau \end{cases}$$

$$\to \begin{cases} \mathrm{D} = \left\{\left\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\right\}(t_1) = \{r_{\mathrm{D}[(q_{\mathrm{o}})_i]_{\mathrm{d}n}}\}(t_0)\right\} \\ \mathcal{R}\left[(Q_{\mathrm{o}_s})_{\mathrm{d}(n+x)}\right]_{\mathrm{D}} = \left[(Q_{\mathrm{o}_m})_{\mathrm{d}n}\right]_{\mathrm{D}} + \left[(Q_{\mathrm{o}_\emptyset})_{\mathrm{d}n}\right]_{\mathrm{D}} \\ \left\{\mathrm{d}\left[(Q_{\mathrm{o}_m})_{\mathrm{d}n}\right]_{\mathrm{D}}, \mathrm{d}\left[(Q_{\mathrm{o}_\emptyset})_{\mathrm{d}n}\right]_{\mathrm{D}}\right\} = (0,0) \\ \{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\}(t) = \{r_{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}}\}(t_0) + \int_{t_0}^{t_1} v\left\{\{r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}}\}(\tau), \tau\right\} \mathrm{d}\tau \end{cases}.$$

Now that we have a mover, the previous $\mathrm{D}(Q_{\mathrm{o}_s})_{\mathrm{d}n} = \left[(Q_{\mathrm{o}_s})_{\mathrm{d}n}\right]_{\mathrm{D}}$ (although no longer needed)—"applying action to QoO"—has logic; otherwise we would not know what we are describing.

The mover exists and applies action to the universe, and the universe is a multi-raiseable/reducible-dimensional existence composed of mass and vacuum, each conserved, and due to their respective conservation, m-v substitution occurs—that is, everything we encounter. "Dynamicity" is omitted here because the mover's action already implies dynamicity. In one sentence: The mover which "applies action to 'the multi-raiseable/reducible-dimensional universe composed of mass and vacuum that each conserved' thereby producing motion" exists.

To continue unifying into a single expression, we only need to let one of the Ds equal the cyclic equation, thus expressing the existence of the cyclic equation. We choose the first D that appears:

$$
\begin{cases}
\left\{ r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}} \in \left\{ \left\{ \left[\mathcal{R}(Q_{\mathrm{o}_m})_{\mathrm{d}(n+x)} \right]_{\mathrm{D}} \right\}_{\mathrm{C}=0} + \left[(Q_{\mathrm{o}_s})_{\mathrm{d}n} \right]_{\mathrm{D}} - \left\{ \left\{ \left[\left(Q_{\mathrm{o}_\emptyset} \right)^c \right]_{\mathrm{d}n} \right\}_{\mathrm{D}} \right\}_{\mathrm{C}=0} \right\}} \right\}(t) \\
= \left\{ r_{\mathrm{D}[(q_{\mathrm{o}})_i]_{\mathrm{d}n}} \right\}(t_0) + \int_{t_0}^{t_1} v \left\{ \left\{ r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}} \right\}(\tau), \tau \right\} \mathrm{d}\tau
\end{cases}
$$

$$
\to \begin{cases}
\left\{ r_{\left\{ \{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}=\left\{ \left\{ r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}} \right\}(t_1) = \left\{ r_{\mathrm{D}[(q_{\mathrm{o}})_i]_{\mathrm{d}n}} \right\}(t_0) \right\}} \right\} \in \left\{ \begin{array}{c} \left\{ \left[\mathcal{R}(Q_{\mathrm{o}_m})_{\mathrm{d}(n+x)} \right]_{\mathrm{D}} \right\}_{\mathrm{C}=0} \\ + \left[(Q_{\mathrm{o}_s})_{\mathrm{d}n} \right]_{\mathrm{D}} - \left\{ \left\{ \left[\left(Q_{\mathrm{o}_\emptyset} \right)^c \right]_{\mathrm{d}n} \right\}_{\mathrm{D}} \right\}_{\mathrm{C}=0} \end{array} \right\}} \right\}(t) \\
= \left\{ r_{\mathrm{D}[(q_{\mathrm{o}})_i]_{\mathrm{d}n}} \right\}(t_0) + \int_{t_0}^{t_1} v \left\{ \left\{ r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}} \right\}(\tau), \tau \right\} \mathrm{d}\tau
\end{cases}.
$$

Of course, the cyclic theory is only a hypothesis; it need not be true. The delayed-choice experiment could be interpreted not as future affecting past but as merely “superposition”; the origin of the universe does not necessarily need to contain the mover; the mover could be something outside the universe that we cannot understand… The cyclic theory relies on mathematically necessary presuppositions—that is, emphasizing plurality to allow “quantum mechanics” (and “quantum mechanics phenomena” have been proven, so plurality is necessary), and then adding identity, so it is more of a purely mathematical support for cyclic cosmology, not a physical one. If we reserve judgment, then we have a universal system of equations and a universal equation/motion equation that leave room for the mover:

$$
\begin{cases}
\mathrm{D} = ? \\
\mathrm{D}\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n} = \left[\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n} \right]_{\mathrm{D}} \\
\mathcal{R}\left[\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}(n+x)} \right]_{\mathrm{D}} = \left[\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n} \right]_{\mathrm{D}} + \left[\left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{d}n} \right]_{\mathrm{D}} \\
\left\{ \mathrm{d}\left[\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n} \right]_{\mathrm{D}}, \mathrm{d}\left[\left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{d}n} \right]_{\mathrm{D}} \right\} = (0, 0) \\
\left\{ r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}} \right\}(t) = \left\{ r_{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}} \right\}(t_0) + \int_{t_0}^{t_1} v \left\{ \left\{ r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}} \right\}(\tau), \tau \right\} \mathrm{d}\tau
\end{cases}
$$

$$
= \begin{cases}
\left\{ r_{\left\{ \{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}=?} \right\} \in \left\{ \left\{ \left[\mathcal{R}(Q_{\mathrm{o}_m})_{\mathrm{d}(n+x)} \right]_{\mathrm{D}} \right\}_{\mathrm{C}=0} + \left[(Q_{\mathrm{o}_s})_{\mathrm{d}n} \right]_{\mathrm{D}} - \left\{ \left\{ \left[\left(Q_{\mathrm{o}_\emptyset} \right)^c \right]_{\mathrm{d}n} \right\}_{\mathrm{D}} \right\}_{\mathrm{C}=0} \right\}} \right\}(t) \\
= \left\{ r_{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}} \right\}(t_0) + \int_{t_0}^{t_1} v \left\{ \left\{ r_{\{[(q_{\mathrm{o}})_i]_{\mathrm{d}n}\}_{\mathrm{D}}} \right\}(\tau), \tau \right\} \mathrm{d}\tau
\end{cases}
$$

And because of the existence of the subscript $\mathrm{d}n$ and the existence of ? , and because of anything else we do not know, Unsolvability Principle—both narrow and broad—takes effect, rendering all of this possibly false, the we have never had and will never have knowledge:

$$\because\ [(k \cap u \neq \emptyset) \Rightarrow (k \subseteq u)] \Rightarrow (\neg k)$$

$$\therefore\ \neg \begin{cases} \mathrm{D} = ? \\ \mathrm{D}\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n} = \left[\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n}\right]_{\mathrm{D}} \\ \mathcal{R}\left[\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}(n+x)}\right]_{\mathrm{D}} = \left[\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n}\right]_{\mathrm{D}} + \left[\left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{d}n}\right]_{\mathrm{D}} \\ \left\{\mathrm{d}\left[\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}, \mathrm{d}\left[\left(Q_{\mathrm{o}_\emptyset}\right)_{\mathrm{d}n}\right]_{\mathrm{D}}\right\} = (0, 0) \\ \left\{r_{\{[(q_\mathrm{o})_i]_{\mathrm{d}n}\}_\mathrm{D}}\right\}(t) = \left\{r_{[(q_\mathrm{o})_i]_{\mathrm{d}n}}\right\}(t_0) + \int_{t_0}^{t_1} v\left\{\left\{r_{\{[(q_\mathrm{o})_i]_{\mathrm{d}n}\}_\mathrm{D}}\right\}(\tau), \tau\right\} \mathrm{d}\tau \end{cases}$$

$$= \neg \left\{ \begin{aligned} & \left\{ r_{\left\{\{[(q_\mathrm{o})_i]_{\mathrm{d}n}\}_{\mathrm{D}=?}\right\} \in \left\{\left\{\left[\mathcal{R}\left(Q_{\mathrm{o}_m}\right)_{\mathrm{d}(n+x)}\right]_{\mathrm{D}}\right\}_{\mathrm{C}=0} + \left[\left(Q_{\mathrm{o}_s}\right)_{\mathrm{d}n}\right]_{\mathrm{D}} - \left\{\left\{\left[\left(Q_{\mathrm{o}_\emptyset}\right)^c\right]_{\mathrm{d}n}\right\}_{\mathrm{D}}\right\}_{\mathrm{C}=0}\right\}} \right\}(t) \\ & = \left\{r_{[(q_\mathrm{o})_i]_{\mathrm{d}n}}\right\}(t_0) + \int_{t_0}^{t_1} v\left\{\left\{r_{\{[(q_\mathrm{o})_i]_{\mathrm{d}n}\}_\mathrm{D}}\right\}(\tau), \tau\right\} \mathrm{d}\tau \end{aligned} \right\}$$

$$\therefore\ \mathrm{p} \in \mathrm{k} = ?\ .$$

References

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