Disconnectedness experiments negating the validity of the Standard Model

ABSTRACT.   In the history of physics it has no precedent the disconnectedness experiment that verifies physical object being outside of our geometry. The purpose of this paper is to provide crucial experiments to show that absolute connectedness assumption the Standard Model relied on is invalid, and to negate the validity of the Standard Model. The disconnectedness experiment negates the nonempty intersection between current geometry and micro-geometry in the depth direction and transitional region between them, and shows that micro-geometry disconnects to current geometry in the depth direction, micro-geometry is the other geometry outside current geometry, and the relationship between the two geometries can only be non-one-one mapping instead of evolution. The logical procedure of negating the validity of SM is as follows. (1) To give the definition of spatial disconnectedness in the depth direction and to determine the elements of the nonempty intersection. (2) To reduce every quantum experiment to reprocess disconnectedness experiment to prove that there is no non-empty intersection between the two geometries, i.e., they are not connected. (3) The spatial connectedness, among all geometrical concepts, is one of the most primitive topological concepts; once the spatial connectedness is invalid, all physical theories based on the connectedness are invalid, and the geometric foundation of SM is invalid. We complete the proof of the invalidity of the Standard Model. Our proof shows that all kinds of micro-forms (including Higgs particles) are secondary existing form of matter in current geometry, but not primitive form. The Standard Model, as a theory of extrinsic particles, is not the ultimate model of the universe physicists have coveted, but is idealist theory based on distorted idealization.

1. It has no precedent in the history to test physical object being outside of our geometry

This paper provides crucial experiments to negate geometric foundation of the Standard Model (i.e., SM), and to negate the validity of the Standard Model.

1.1. The Standard Model relies on absolute spatial connectedness

The first major law of SM is absolute geometry (i.e., absolute space) assumption, and the second is the principle that deals with energy and interactions in micro-region. The former is the geometric foundation of the latter, since the formulism in the latter are expressed in terms of state-vectors and operators on the absolute space. Splitting physical space into micro-geometry and current geometry (see Sec.2.), the main hypotheses of absolute geometry are as follows: (a) Absolute connectedness: micro-geometry absolutely connects to current geometry, all matter is intrinsic, and current geometry is the extension of micro-geometry. (b) Provability of absolute connectedness: physicists are able to confirm the absolute spatial connectedness and the intrinsic existence of quantum form in terms of numerical analysis of quantum experiment, under the condition that he with his signal tool doesn't enter micro-region.

C.F. Gauss was the first to propose idea of intrinsic geometry, in which extrinsic observer is distinguished from intrinsic observer in a connected space. For over a century, physicists and mathematicians have used many mathematical tools (e.g., group theory, differential geometry, and topology) to express subatomic scale material forms. However, they have never studied the

connectivity of physical space in the depth direction, and have not studied the external observers outside the unconnected space. The physical significance of the disconnectedness experiment is far beyond the expectation for the two reasons. (a) The spatial connectedness, among all geometrical concepts, is one of the most primitive topological concepts, which is much more primitive than quantum fields (including Higgs particles). Once the spatial connectedness is not valid, all physical theories based on the connectedness are not valid. (b) The definition of connectedness is so elementary and simple and independent of SM. It only involves the existence of common members to the two spaces. The verification is not difficult, and the reliability of experimental evidence is much higher than that of numerical analysis of high-energy experiments.

1.2. It has no precedent in the history to test a physical object being outside our geometry

In the history of physics it has no precedent to test a physical object being outside of our space. We re-examine the relationship between geometry and matter world. Absolute connectedness, in fact, is a philosophical belief that originated in the connectedness of human lab and galaxies based on optical signals for thousands of years. No one has ever studied why spatial connectedness experiment in the depth direction is needed and how to do it. Our work will overthrow such a traditional idea that from the connectedness between Earth Lab and GN-z11 galaxy, we can extrapolate to the connectedness between the Earth Lab and micro-space locating Higgs particles in the depth direction. The mathematical definition of disconnectedness is very simple: there are no nonempty intersection in two disconnected topological spaces. Proof or disproof of non-empty intersection is much easier than confirming Higgs particles. This paper will show that micro-geometry and current geometry are disconnected in the depth direction, because in each and every quantum experiments there is evidence of non-one-to-one mapping between the two spaces but no evidence of "nonempty intersection".

1.3. Honest physics: is the Standard Model an idea wrapped in formulism or strict theory agreed with experiments

The starting point of our study is that "the scientist's first claim will always be intellectual honesty…" (Heisenberg)[1]; space concept wrapped in formulism without a legalized idealization must be denied. The question is: why is honesty so important for disconnectedness experiments? We argue as follows: In Newton physics the idealization usually does not accompany the distortion of the relation between experiment and theory, but this is not the case for micro-physics, the verification of "no nonempty intersections" depends on the idealization of expressing experiments in an honest way. Honest physics means that idealized experimental process is expressed in their true colors. A physical theory is said to be idealist, if the idealization of experimental process involving absolute space distorts the process itself and the relationship between experimental process and theory. The galaxy theory based on Hubble's experiments is honest, because the connectedness between the Earth lab and the galaxy is supported by light-signal exchange common to the two spatial regions. The purpose of this paper is, based on honesty, by experiments (not formal deduction), to show that there is no connectedness between quantum field and current geometry, all kinds of quantum fields (including Higgs particles) are secondary existing form of matter in current geometry, rather than intrinsic forms; the absolute connectedness SM relies on distorts the relation between experiments and space theory, and SM is not honest, but idealist physics.

The logical procedure of negating the validity of SM is as follows. (1) To give idealization rule of space concept, to give the definition of disconnectedness in the depth direction and to determine the elements of the nonempty intersection. (2) To reduce every quantum experiment to reprocess disconnectedness experiment, in an honest way, to prove that there is no non-empty intersection

between micro-geometry and current geometry, i.e., they are not connected. (3) Consequently, to confirm that geometric foundation of SM is invalid.

2. Two crucial experiments: negating absolute connectedness

There are three basic space concepts: connectedness (including disconnectedness and intrinsicness), current geometry (including its derived sub-geometry) and absolute space. People have underestimated their significance in quantum physics. "Nonempty intersection between current geometry and micro-geometry" is the key concept in this paper.

2.1. Idealization rule

The definition of "nonempty intersections" involves idealization rule. Idealization rule is defined as the rule for translating substantial forms into mathematical expressions. In physics the most basic rule of idealization is the point-idealization rule for translating bodies of reference into reference system (coordinate system), by which, reference units that have the same size in scale and physical properties are idealized as mathematical points of reference system.

2.2. Physical definition of current geometry

(1) Current geometry, as foundation of space concept, is essentially different from mathematician' definition, since it gives an explicit idealization procedure of space concept. Current geometry (3-dimensional intrinsic geometry) is defined as such a set of points satisfying the following conditions. (a) The set of points is stated mathematically as current reference system (abbreviated C-RS). The following idealization rules are used by people: (ⅰ) C-RS is defined as idealized rigid bodies of reference, and its point as idealized intrinsic reference unit, and "Intrinsic" means that there is signal responding between reference units defined by Einstein's theory such that observer, in terms of the responding, is able to produce coordinate labels, coordinate-differences (Δx, Δy, Δz) and computation formula of metric properties (e.g., computation of the first fundamental form). (ⅱ) The operability of C-RS and the responding can be ignored. (b) Spatial regions are connected in both depth and horizontal direction. The following idealization rule is used by people: all reference units common to the two systems have the same physical properties; the operability of responding system common to the two regions can be ignored. (c) The current event is defined as the correspondence (or measurement) from current object O_C to C-RS based on common signal responding procedure such that O_C is an intrinsic membership of current geometry and shares the labels and intrinsic properties in current geometry. The following idealization rule is used by people: the measuring process that makes the identity between measuring object and reference unit can be ignored, and the validity check of the measured event can be ignored. Note that the word "reference system" is as "geometry" with the same meaning since we do not need consideration for the dependent of connectedness on topology.

(2) Internal membership of current geometry is defined to be a subset of C-RS such that it can be used to be an operable reference system for which there is operable responding procedure between its components.

(3) Derivative sub-geometry of current geometry means a reference system (noted by C-RS$_{der}$) derived from current geometry such that C-RS$_{der}$ is obtained in terms of scaling down C-RS, there is certain signal tool (called sub-responding) that is derived from current signal responding, and produces coordinates, coordinate-differences and computation of metric formula. The microscopic geometry, in terms of which SM describes quantum fields, in fact, is derivative sub-geometry of current geometry.

2.3. Definition of disconnectedness (refers specially to the depth direction)

(1) Let C and M respectively be current and microscopic reference systems with the different reference unit u_C and u_M in scale, micro-geometry and current geometry are said to be disconnected, if there is no nonempty intersection of them. Here the three essentials (i.e., three common elements) of the nonempty intersection are as follows. (1) u_M can be applied to C; Scaling down C, the scaling down u_C is member of M and can be applied to M. (b) The event e_C that occurs in C is an event in M, and the event e_M that occurs in M is an event in C. (c) Let r_C and r_M be the signal responding systems respectively in C and in M, they are common to C and M. Clearly, the three 2-tuples (u_C,u_M), (e_C,e_M), (r_C,r_M) are central concepts of spatial disconnectedness.

The intrinsic existence is relative: if current geometry disconnects to micro-geometry, then only membership of current geometry is intrinsic, otherwise is external.

(2) Assumption of absolute space is as follows. (a) Absolute connectedness: Any micro-region connects to current space in the depth direction, the three common elements of the nonempty intersection are (u_C,u_M), (e_C,e_M), (r_C,r_M). (b) Absolute intrinsicness: All matter forms (quantum form, classical carrier charged with data of high-energy experiment and the middle matter forms in the range between the above two) are intrinsic in a connected geometry.

2.4. Two crucial experiments

We provide two crucial experiments. The first disconnectedness experiment (or disconnectedness experiment for short) negates the nonempty intersection between current space and micro-space. It verifies that micro-geometry is outside current geometry. However, do not rule out the possibility of transitional space. The second disconnectedness experiment (or complete disconnectedness experiment) verifies that there is no nonempty intersection between current geometry and micro-geometry, and no transitional space (no quantum-to-classical transition process, i.e., no such object that is both intrinsic and extrinsic for current geometry). In this paper the emphasis is placed upon the first crucial experiment, which is critical step for overthrowing absolute space.

2.5. Experimental principle of disconnectedness experiment

The first experiment negating absolute time (ether), as well known, was the Michelson-Morley experiment. It is absolutely not enough to negate absolute space through one or a family of experiments, because absolute space is the last cornerstone of all physical theories. We need super powerful experimental evidence: every experiment ever performed by human negates "nonempty intersection between the two spaces".

Principle of disconnectedness experiment is as follows: (1) The absolute connectedness is such space concepts that lurk among every experimental process, and every quantum experiment is a crucial experiment. The disconnectedness experiment is a collection of all quantum experiments. (2) The disconnectedness experiment is the lowest-level quantum experiment, which only determines whether the common elements of two geometries exist. Stripping away any part of the known quantum experiment that is not related to connectedness and leaving only the part related to the "nonempty intersection", we can reduce the experiment to a disconnectedness experiment, called reprocess disconnectedness experiment. (3) It is proved in an honest way that there is no "non-empty intersection" in every quantum experiment. Particularly, the honesty requires us to take in the fact that experimenter's signal tool is unable to enter micro-space. (4) "No nonempty intersection between the two spaces" is reduced to validity check of solution of quantum case, and finally to the extrinsic recursion of quantum process, the essence of which is that there is no one-one mapping from micro-geometry to current geometry.

3. Neutrino experiment: reprocess disconnectedness experiment

We reduce the neutrino experiment [2] to reprocess disconnectedness experiment. In this paper, the terms "quantum case" and "quantum experiment" mean the same item. The current solution of quantum case is defined as a theoretical description of the related set $\{e_C\}$ of current events in current geometry. The micro-solution of quantum case is defined as a theoretical description of the related set $\{e_M\}$ of microscopic events in the derivative sub-geometry (in C-RS$_{der}$).

3.1. Reference unit u_C and u_M do not belong to the nonempty intersection

The devices of neutrino experiment consist of cylindrical stainless-steel tank, ultra-pure water (or liquid argon), photomultiplier tubes (PMT), computer, monitors, etc. (1) People are able only to use C-RS fixed to the devices and unable to directly operate on micro-unit u_M in micro-region. (2) People assume in their theory that the intrinsic existence of u_M and C-RS$_{der}$, which provide microscopic coordinates and coordinate differences. However, there is no evidence of operable u_M and C-RS$_{der}$. Consequently, u_M is not member of current geometry, u_C is not member of micro-geometry, and they do not belong to the nonempty intersection between the two geometries. The intrinsic existence of u_M the neutrino theory implies is not experimental fact, but distorted idealization.

3.2. Current solution does not belong to the nonempty intersection

We define current counterpart CC(O_{micro}) of micro-object O_{micro} as such internal membership of current geometry that corresponds to O_{micro} and represents O_{micro} in the experiment. The current counterpart of the neutrino is indicating signal of PMT. Current solution of the neutrino case is the process characterized in terms of C-RS attached to the devices and the current counterparts representing the neutrino in current geometry. Similar to the base case of computable procedure that produces result, the current solution depends only on current geometry and current counterpart and provides current results. The current solution consists only of current events, does not belong to micro-geometry, and does not belong to the nonempty intersection between the two geometries. For the current solution, there is no distorted idealization of space concept.

3.3. Micro-solution and inherent solution involve spatial disconnectedness

(1) The micro-solution depends on the current solution and the connectedness between the two spaces. According experimental principles, we must eliminate the distorted idealization of the connectedness. (2) Inherent solution of quantum case is defined as such an intrinsic solution in 3-dimensional micro-space that is described in terms of by inherent coordinates and coordinate differences, and is independent of the coordinates of current reference system. The derivative sub-geometry, which is obtained in terms of scaling down current geometry, must be distinguished from micro-geometry based on micro-intrinsic reference system, which is applied to micro-matter for obtaining indicator label along a geodesic in terms of certain signal responding in 3-dimensional micro-region. The inherent solution involves spatial disconnectedness.

3.4. Current signal responding does not belong to the nonempty intersection

In the neutrino experiment the current signal responding r_C is only applied in current geometry, and is unable to be enter to micro-geometry. On the other hand, the micro-responding between micro-points in the derivative sub-geometry is derivative concept only, and there is no evidence of substantial micro-responding r_M that produces microscopic coordinate labels. Consequently, r_C does not belong to micro-geometry, and not belong to the nonempty intersection between the two geometries.

3.5. The micro-solution does not belong to the nonempty intersection: validity of micro-solution and extrinsic recursion

Now, it has been crucial in negating the disconnectedness to negate that quantum event e_M belongs to the intersection. To prove that e_M does not belong to the nonempty intersection of the two spaces, we must disprove the validity of the micro-solution. Exactly speaking, the validity of micro-solution means that (a) agreement between current solution and the experiment, (b) the validity of "micro-solution deriving current solution". We break down (b) into two parts: (b-1) mathematical validity of "micro-solution deriving current solution", (b-2) agreement between experiments and the theory involving "micro-solution deriving current solution". Thus, the validity of micro-solution finally determined by (b-2), since (a) and (b-1) can be ignored usually. We introduce the extrinsic recursion of quantum process. In computer science recursive procedure means that solution of bigger problem is expressed in terms of smaller problems, and all other cases can be finally reduced toward the base case that provides result. In fact, the recursion calling itself, as a rule, defines such an equivalence class that validity of bigger case is determined by the validity of base case and the validity of the recursive process (including all elements of the equivalence class). In similar manner, extrinsic recursion of quantum case can be defined by two properties: a base case (current solution) and extrinsic process involves invoking the process itself. The following analysis will show that (b-2) requires invoking validity check itself. This extrinsic recursion limited to current geometry negates that extrinsic quantum event e_M and corresponding intrinsic event belong to the same equivalence class, and negates that extrinsic quantum event belongs to the nonempty intersection between the two spaces. It must be pointed out that the idealization without the validity check required by (b-2) is dishonest.

Let S_1, T_1 and I_1 respectively be current solution, micro-solution in C-RS$_{der}$ and intrinsic solution in micro-geometry. Let E_1 be the experiments verifying T_1, and agrees with T_1. In experiments E_1 all data are finally provided by current counterparts of the neutrino. The theory that describes the correspondence between micro-object and its current counterpart in current geometry is called micro-to-current theory. It is just the theory involving "micro-solution deriving current solution". For E_1 let micro-to-current theory be $T_2=T_2(T_1,E_1)$, which contains Cherenkov radiation, signal amplification, etc. The experiments E_2 verifying T_2, in the same way, leads to new micro-to-current theory $T_3=T_3(T_2,E_2)$, and so on. Thus, the validity check leads to a series that involves invoking the process itself: (T_1, E_1), $(T_2(T_1,E_1), E_2)$, $(T_3(T_2,E_2), E_3)$, $\cdots$ (there may be repeated terms). There are the following differences of recursive process of validity check from the recursive process of computation. (a) There is a series of check experiments: E_1, E_2, $\cdots$ such that physicist is able only to operate current reference system, and there are extrinsic data provided by current counterparts in current reference system only. Namely, series E_1, E_2, $\cdots$ reduces to current solutions of base cases provide by the correspondence between C-RS and current counterparts: S_1, S_2, $\cdots$. (b) In the series there is no transited object between micro-object and the current agent. (c) The terminating condition of extrinsic recursion is that the series invokes all known quantum experiments, and the recursion concerns all quantum principles. This means that the validity of micro-solution is guaranteed by all current solutions of all known experiments, and the invoked experiments do not make any contribution to the relationship between the micro-solution and the inherent solution. Therefore, we arrive at the following conclusions in the neutrino case: micro-solution without validity check is not complete; quantum form, as micro-solution of quantum case, is an extrinsic form defined by extrinsic recursion invoking itself (or invoking all current solutions of known experiments). The essence of the extrinsic recursion is that there is no one-one mapping $e_M \rightarrow e_C$ from e_M to e_C. Therefore, the micro-solution does not belong to micro-geometry, and quantum event e_M is not common to the two spaces.

3.6. There is no nonempty intersection between the two spaces

In the neutrino experiment the true truth is as follows: (1) The reference micro-unit u_M people use in their theory is derived from current reference system in terms of scaling down current unit; there is no evidence of operable micro-unit, and the current unit u_C is unable to be applied in micro-region. (2) Quantum event e_M, as process of extrinsic recursion, is derived in terms of C-RS and calling current events, there is no one-one mapping $e_M \rightarrow e_C$. (3) There is no evidence of micro-responding r_M, and r_C is unable to be applied in micro-space. Therefore, the three essentials (u_C, u_M), (e_C, e_M), (r_C, r_M) people assume in the principle of the neutrino experiment do not belong to micro-geometry, and are not the members of the nonempty intersection between the two spaces. The neutrino experiment, as reprocess disconnectedness experiment, provides evidence of non-one-one mapping from micro-object to C-RS, but not evidence of the intersection of micro-space and current space. The spatial connectedness the Standard Model assumes is a distorted idealization, does not agree with experiments, and is dishonest.

4. Experiment of tripping photon: reprocess disconnectedness experiment

We reduce the experiment of tripping photon [4] to reprocess disconnectedness experiment.

(1) The assumption of absolute space is used in the experimental principles (e.g., Rydberg atoms and QND Detection).

(2) All the devices (box preparing Rydberg atoms, Ramsey cavities, the cavity under QND Detection, interferometer, ionization detector, computer, etc.) are classical in current geometry. The current counterpart of photon is the indicating signal, including red and blue bars in QND detection. The current solution of tripping photon case is provided in terms of CRS and the current counterparts. The micro-solution is described in terms of the set $\{e_C\}$ of current events in C-RS$_{der}$. There is no evidence of reference micro-unit u_M and micro-responding r_M. Therefore, current unit u_C, micro-unit u_M, current responding r_C and micro-responding r_M do not belong to the nonempty intersection between the two spaces.

(3) The micro-solution is the theoretical description of the related set $\{e_M\}$ in C-RS$_{der}$. Similar to the neutrino case, its validity is finally determined by the validity of "micro-solution deriving current solution", which depends on micro-to-current theory in the absolute space (e.g., JC Model, QND detection and signal-multiplier, etc). The validity check produces a series involves invoking itself: (T_1, E_1), $(T_2(T_1, E_1), E_2)$,···. The complete process of tripping photon shows that the quantum events $\{e_M\}$ are derived in terms of current reference system and current data (including current counterparts). There is no one-one mapping $e_M \rightarrow e_C$. Therefore, $\{e_M\}$ and the micro-solution do not belong to micro-geometry, and do not belong to the nonempty intersection between the two spaces.

The honest conclusions are as follows. (a) The three essentials (u_C, u_M), (e_C, e_M), (r_C, r_M) people assume in the principle of the trapping photon experiment are not the members of the nonempty intersection between the two spaces. The trapping-photon experiment, as reprocess disconnectedness experiment, proves that the microscopic area involved in the experiment is disconnected to the current geometry. (b) The micro-solution that describes the trapping photon is defined as such an extrinsic recursion in current geometry that current counterpart is used and all quantum experiments are invoked. Clearly, people, unfortunately, use the distorted idealization such that disconnectedness is distorted as connectedness, extrinsic existence of reference micro-unit as intrinsic existence, and the extrinsic photon as intrinsic photon. There is no one-one mapping $e_M \rightarrow e_C$. (c) The experiment provides evidence of non-one-one mapping between the two spaces; however, the absolute connectedness of physical space is invalid, and the effect of trapping photon is true but its intrinsic existence is not valid.

5. Large Hadron collider (LHCb) experiment: reprocess disconnectedness experiment

We reduce LHCb experiment [4] to reprocess disconnectedness experiment.

(1) The assumption of absolute space is used in the experimental principles.

(2) All the devices (Tracker, Electromagnetic calorimeter, muon chambers, Cherenkov detector. vertex detector, magnet, computers. etc.) are classical. The reference systems fixed to the devices are current system C-RS. The current counterparts of measured particles are the indicating signals provided by the devices. CRS and the current counterparts provide the current solution, which is described only in terms of current events. There is no evidence of reference micro-unit and micro-responding. Therefore, u_C, u_M, r_C and r_M do not belong to the nonempty intersection between the two spaces.

(3) The validity of the micro-solution is finally determined by the validity of micro-solution deriving current solution, and the validity check produces extrinsic recursion invoking itself. The micro-solution of LHCb experiment (including Higgs particle experiment) is such an extrinsic process that invokes itself in terms of current counterpart and invokes all extrinsic results of known quantum experiments. Under the condition that there is no signal exchange common to current geometry and micro-geometry, in order to confirm the identities of the recorded current effects and sub-atomic scale micro-events, people have made the following distorted idealization treatment: scaling down the current geometric calculations (such as length, angle, and area), and reducing relativistic effects recorded in the current region to the sub-atomic scale. Because the sub-atomic scale events $\{e_M\}$ are derived from current geometry, there is no one-one mapping $e_M \rightarrow e_C$. Therefore e_M do not belong to the nonempty intersection between current space and micro-space.

We conclude in an honest way: (a) LHCb experiments, as reprocess disconnectedness experiments, negate the intersection of micro-space and current space, and prove that current geometry disconnects to micro-geometry; (b) LHCb experiments provide the evidence of non-one-one mapping between micro-space and current space. (c) The verification of the fundamental particles is extrinsic rather than intrinsic, and the extrinsic picture of extrinsic high-energy particles provided by LHCb experiments is true but their intrinsic existence is invalid.

6. Spatial connectedness in the depth direction is invalid

6.1. Two non-high energy experiments: as reprocess disconnectedness experiments

(1) Stern-Gerlach experiment [5]**.** A beam of silver atoms from an oven was through magnetic field region, falls finally on photographic emulsion and two separate lines were showed. Absolute space is assumed. All the devices (oven, magnetic field, and emulsion) are classical in current geometry. All data (length, time, temperature, gradient, etc.) are provided by current reference system attached to the devices. The current counterpart of silver atom is the visible trace in the emulsion. The current solution is provided by CRS and the current agents. The micro-solution is the expression of quantized spatial orientation in C-RS$_{der}$. The correspondence between the atoms and their current agents involves ionization theory, deflection of silver beam, etc, and the validity check lead to the extrinsic recursion involves invoking itself. The recursion terminates with invoking all known quantum experiments. **(2) Wave experiment of the fullerene C60** [6]**.** All the devices (Oven, two slits, SiNx grating, laser, channeltron electron multiplier, conversion electrode etc) are classical. The

current agent of C60 is the indicating signal provided by channeltron electron multiplier. The current solution is provided by CRS and the current counterpart s in current geometry. The validity check of micro-to-current theory involving diffraction, ionization and signal multiplier produces an extrinsic recursion invoking itself. Consequently, in this experiment the fullerene defined as such an extrinsic recursion in which current counterpart is used and extrinsic solutions of all quantum experiments are invoked.

For the two experiments above, we conclude: the nonempty intersection between micro-space and current space is negated, the absolute connectedness between the two spaces is invalid.

6.2. Absolute connectedness is negated by every quantum experiment

The experiments above, as representative ones of the full range of experiments, cover all kinds of matter (photon, neutrino, hadron, atom, large-molecule, etc.). Each and every quantum experiment can be reduced to reprocess connectedness experiment, and the distorted idealization previously lurked in every experiment came to the surface. We conclude as follows. (a) There is no nonempty intersection between current geometry and micro-geometry, and they do disconnect. (b) For any quantum case there are three solutions: current solution, micro-solution and inherent solution, which are respectively in current geometry, derivative sub-geometry and micro-geometry. The validity check of micro-solution leads to extrinsic recursion of quantum experiment that invokes itself and recursion terminates with invoking all known quantum experiments. Quantum form, as extrinsic form, is not inner membership of current geometry, but extrinsic form. There is no one-one mapping from micro-geometry to current geometry. (c) The inherent solution and the micro-intrinsic reference system that describes inherent solution are undecidable. (d) The micro-solution depends on current reference system; the inherent solution cannot depend on current geometry that is outside micro-geometry. Consequently, the inherent solution of quantum case does not equal the micro-solution. (e) Based on the four points above, micro-geometry is the other geometry outside current geometry, the relationship between the two geometries can only be non-one-one mapping instead of evolution. Our proof shows that all kinds of micro-forms (including Higgs particles) are secondary existing form of matter in current geometry, but not primitive form. The Standard Model, as a theory of extrinsic particles, is not the ultimate model of the universe physicists have coveted, but is idealist theory based on distorted idealization.

Any physical concept must be verified by experiments, and spatial connectedness is no exception. Physicists have never provided experimental and theoretical proofs of the connectedness between micro-geometry and current geometry. That absolute space is overthrown by a non-formal proof has no precedent in the history of physics. It must be pointed out the following three points. (1) Extrapolating the connectedness between human lab and galaxies in depth direction to the connectedness between human lab and Higgs particles violates scientific principles. (2) Mathematicians developed mathematical logic as the criterion for honest and dishonest reasoning procedures, but physicists seem unwilling to develop exact experiment theory as the criterion for honest and dishonest idealized procedures. (3) Heisenberg and Bohr asserted that any quantum experiment must ultimately be expressed in terms of classical concepts [1][3]. Their assertion implied the doubt about the distorted idealization of space concept.

7. Complete disconnectedness experiment

7.1. Experimental principle

The principle of the complete disconnectedness experiment is as follows. (1) The complete disconnectedness means that there is no nonempty intersection, no transitional space. It is excluded the observable object that is both intrinsic and extrinsic. (2) Intrinsic object, as a membership of current geometry, is defined as current reference body such that there is operable responding procedure between its components. For the intrinsic membership of current geometry, which is not extrinsic object, there is no de Broglie wave. (3) Extrinsic object is defined as extrinsic recursion process involving current agent. Broglie wave is extrinsic picture of micro-object. (4) The complete disconnectedness experiment means a family of experiments that test upper bound of extrinsic matter and lower bound of current geometric matter. The experimental aim is to show that the transitional region from micro-geometry to current geometry is limited to a small enough size that only a cliff-type transition (i.e., mapping between two disconnected geometries) can occur. The Broglie wave experiment belongs to family of complete disconnectedness experiments.

7.2. Known complete disconnectedness experiments and rejection experiment

The known complete disconnectedness experiments are as follows. According to the known reports, myoglobin (about 4nm in diameter) [7] and fullerene (C60, about 0.7nm in diameter) [6] satisfy the definition of extrinsic object, because their stereoscopic structure is based on crystal diffraction, in which current counterpart s must be used, and there is extrinsic recursion. They don't satisfy definition of intrinsic matter, because they are unable to be current reference body and there is no operable responding procedure between their components. On the other hand, the minimum size of operable current reference system is about several nm at least. We expect that new experiments will precisely provide upper bound of extrinsic matter and lower bound of current geometric matter, and show that the transitional region from micro-geometry to current geometry is limited to a small enough size that only mapping between two disconnected geometries can occur. The drawback of the known complete disconnectedness experiments is that the evidence is far from sufficient to judge the complete disconnectedness between two geometries.

We propose to do rejection experiment of the complete disconnectedness. Quantum experiments can be divided into two kinds: one with full extrinsic invocation, one without extrinsic invocation. The experimental foundation of overthrowing absolute connectedness is the extrinsic recursion, which means that every quantum experiment is the experiment with full extrinsic invocation. It is the principle of the rejection experiment that one quantum experiment without extrinsic invocation is enough to reject the complete disconnectedness. The convenient rejection experiment is trapping one quantum individual or one eigenstate of quantum system (including trapping collapse of state) without extrinsic invocation. We propose to do such experiment that one eigenstate of two-qubit system is trapped without extrinsic invocation, i.e., connectedness experiment that tests connectedness between the two geometries. However, we emphasize that performing such a trapping without extrinsic invocation is inconceivable, because the trapping, in fact, overthrow the statistic nature of quantum phenomena, and overthrow quantum theory itself. For example, single photon counter is with full extrinsic invocation; cooling and trapping a quantum system to its ground state is with full extrinsic invocation. S.Haroche group reported trapping photon [5], A.N.Cleland group reported single-phonon control of visible resonator [8]. However, in their verifications current counterpart s were used, extrinsic solutions of all known experiments were invoked. Overthrowing the absolute connectedness means denying the thought experiment (e.g., Schödinger's cat experiment and Wheeler's delayed choice experiment) that assumes the spatial connectedness (i.e., signal exchange between the two spaces).

8. Discussion

8.1. Mapping between two disconnected geometries based on representation of group

Negating absolute connectedness opens the door to new possibilities. By the disconnectedness, for the same micro-region there are two geometries: micro-geometry G(I) and the derivative sub-geometry G(derived). From the mathematics point of view, it is logical that there is a non-one-one mapping between two disconnected spaces, and it is not logical that generations of matter evolve through two disconnected spaces. Unfortunately, people have not developed the appropriate mathematical tools for the non-one-one mapping between two disconnected spaces, which produces abstract state space and probability contribution. A complete micro-physical theory must consist of pair (G(I), G(derived)) and mapping T(I)→Q(C), where T(I) is micro-intrinsic physical system in G(I), Q(C) is quantum form we observe in current geometry, and mapping T(I)→Q(C) means that current matter imposes its classical property on the physical unit of the extrinsic form, and that extrinsic quantum form Q(C) is a new form of T(I). Isomorphism, based on representation of group, between global algebraic property of micro-system and the corresponding extrinsic form would be principal topic of quantum physics we expect. The invariance of global property of micro-system under the non-one-one mapping is the key ingredient for producing abstract state space and probability contribution. The basic idea of the Standard Model is a dogmatic from ancient Greek philosophy: all kinds of matter can be filled on a unified geometry, and matter can't be changed in existence form by the restriction of subsequent generation. However, the disconnectedness denies this dogmatic about space.

We consider our work as a new theoretical development of the Copenhagen interpretation. We restate the starting point of Copenhagen's interpretation, "any quantum experiment must ultimately be expressed in terms of classical concepts", as the following statement about the relationship between geometry and matter. (1) Current geometry does not connect to micro-geometry. (2) Current geometry takes precedence over micro-geometry. Current geometry limits the inherent form of existence of micro-matter such that quantum form, as a micro-solution of quantum experiment, is defined as extrinsic recursion of invoking the relevant current solution (including the current measurement process); disconnectedness prohibits microscopic events from being directly observed, that is, prohibits the correspondence between micro-events and current events without invoking the current solution. (3) The position of measurement is replaced by geometry, the abstract state space and probability contribution originates from the non-one-to-one mapping from micro-space into current space.

8.3. Honesty refuses to wash white the experimental sources of space concepts

According honesty principle, we refuse such physics that the numerical analysis in current geometry is converted into scaling-down data in derivative sub-geometry, and then through distorted idealization the scaling-down reference unit is "laundered (washed white)" as intrinsic pure-mathematical points in sub-atomic scale, and then it is assumed that these points have a certain nature to construct the ultimate description of our universe. Our work shows the two points. (1) In all quantum experiments the evidence points to the spatial disconnectedness in the depth direction, the relationship between the two geometries can only be non-one-one mapping instead of evolution. The Standard Model is based on distorted idealization of spatial connectedness. High-energy experiment is such extrinsic experiment only that leads people to discover extrinsic quantum forms yielding to some extrinsic symmetry, but does not provide inner ultimate description of our universe. (2) By the spatial

disconnectedness, no workable experimental foundation within current geometry can ever be strong enough to prove or disprove the ultimate origin of current geometry. In this sense SM would be rejected, unless people provide the proof of connectedness between micro-space and current space and proof of intrinsic existence of quantum matter. For SM the important problem is to show its particles classification reflects mapping T(I)→Q(C), but not to find Higgs particles.

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