Superballs and Superstrings

by Hisashi Nando

Abstract

Superball theory, which I propose here, is a new hypothetical theory that is somewhat similar to superstring theory. Both theories have different principles but bring somewhat similar conclusions. Superball theory is hinted by a new idea and takes a new model: the model of superballs, instead of the model of superstrings. Superball theory is not a numerical theory that deductively deals with basic numerical equations but a model theory that deals with geometrical conceptions. Superball theory uses no numerical equations but uses its own model so that it can bring many important conclusions. For example, this theory can resolve the difficulty of infinity and the problem for the existence of gravitational waves.

Summary

At first I list the basic points or basic conclusions of superball theory as follows.

Superball

- Superball theory is a model theory. (instead of numerical theory that deals with numerical formulas)
- Superball theory and superstring theory have different principles but have somewhat similar conclusions.
- To speak metaphorically or geometrically, a superball is a sphere, while a superstring is a string.
- We should suppose that superballs exist in the space of complex numbers, while superstrings exist in the space of real numbers and are described with complex numbers.
- Superballs do rotate in the space of complex numbers, while superstrings do vibrate in the space of real numbers.
- The rotation of a superball in the space of complex numbers corresponds to the

vibration of a superstring in the space of real numbers.

- The rotation of a superball and the vibration of a superstrings have different meanings in their models but have the same sense in the real world. This same sense is the wave motion of a quantum.

Billiard Model

- The foundation of superball theory is a model that is named "billiard model".
- Billiard model explains how a quantum moves or travels in a space.
- Billiard model suggests that a quantum's movement is not one phenomenon as a particle's movement but two phenomena which consist of disappearance and appearance. When a particle disappears in a place and afterwards another particle appears in another place, observers regard these two phenomena as a phenomenon of one particle's movement.

Particle and Wave

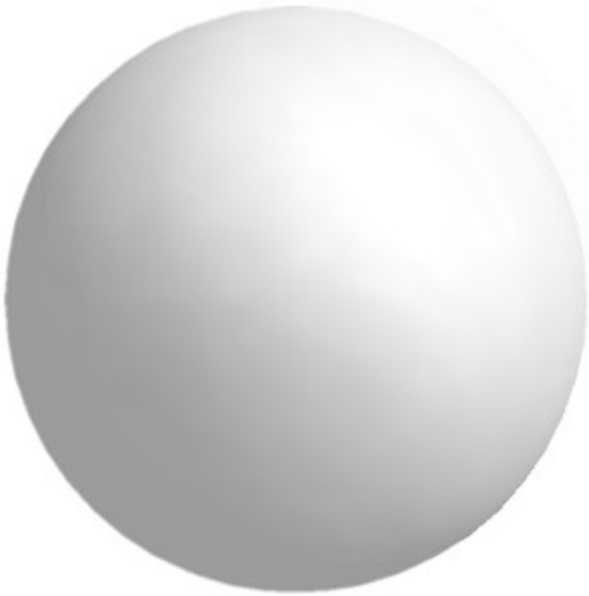
- Billiard model regards a moving quantum as waves of balls instead of mere waves or a mere particle.
- A quantum that moves rapidly has the properties of waves, while a quantum that stands still has the properties of a particle.
- When a quantum moves, it changes its form in the order such as "particle → wave → particle". This means that one quantum can have three forms: the form of a particle at the starting point, the form of waves in the intermediate space and the form of a particle again at the end point.
- When a quantum travels, no particle moves from the starting point to the end point but every superball in the space vibrates a little at its own position. This vibration of micro size is transmitted from the starting point to the end point in the space. This transmission is wave motion or waves.
- When a quantum has the form of a particle, it exists in a narrow area. When a quantum has the form of waves, it exists in a broad area of the space.
- Every quantum can convert itself from the form of a particle to the form of waves and also can convert itself from the form of waves to the form of a particle. These conversions of both directions is named "the conversion of a particle and waves". When this conversion occurs, the area where a quantum exists also changes the size. For example, when a quantum converts itself from the form of a particle to the form of waves, its area also changes the size from a small size to a large size: i.e. from a

narrow range to a broad range.

- These process mentioned above can be explained by the billiard model.

The Ether

- Superball theory suggests that a vacuum is not empty but is filled with superballs while all superballs are equivalent each other.
- In order to emphasize that a vacuum is filled with superballs, we could name the vacuum "the ether". The ether is not substance.
- Superballs correspond to particles and antiparticles. For example, electrons and positrons.
- A superball is not a fixed particle. For example, no superball is fixed to an electron nor to a positron. A superball is regarded as an electron at a time, regarded as a positron at a time, regarded as a meson at a time, regarded as a antimeson at a time. A superball is not a fixed substance.
- Such a property (above) of superball has a reasonable ground, which is the fact that a vacuum can make a pair creation of any type, such as a pair creation of electron and positron or a pair creation of meson and antimeson.



[fig00]

[an imaginary drawing of a superball]

Introduction

Superball theory, which I propose here, is a new hypothetical theory that is somewhat similar to superstring theory. Both theories have different principles but bring somewhat similar conclusions. For example, Superball theory concludes that our cosmos should have 10 dimensions which consist of 1 dimension of time, 3 macro dimensions and 6 micro dimensions.

Superball theory and superstring theory have similar conclusions but have different principles. Superball theory is not a numerical theory but a model theory. This is very important. Therefore, to emphasize this, I take up the comparison of them as follows.

- superstring theory: from simple numerical formulas to a complicated system.
- superball theory: from a simple model to simple numerical formulas.

Superstring theory (and other theories of physics) adopts a deductive method based on the method of Mathematics: from simple equations to a complicated system. Physicists firstly take up numerical formulas and secondly regard a quantum as something that accords with numerical formulas. They take up numerical formulas unconditionally. This means that numerical formulas as basis have no reason nor ground. Physicists regard numerical formulas just as an assumption. They can make the judgment to the question whether numerical formulas are right or wrong only by the fact whether or not the whole theory could give conclusions that accord with experiments.

Superball theory does not firstly take up numerical formulas but does firstly take up a model, which is an embodiment of an idea. Superball theory suggests that we physicists should firstly take up a model and should secondly get numerical formulas as the formalization of the model. If we would take up a model, then we could naturally get some numerical formulas. These numerical formulas would be enough, though there remain some undetermined values, which are constants that should be determined by experiments. Thus the big part should be determined by the theory and only small parts should remain for experiments.

Let's take an example of such a method in history. It was the method of Maxwell. Did Maxwell get his equations of electromagnetic wave by accident or by sudden? No. He firstly took up a model of micro balls like superballs and secondly got his equations as the formalization of the model. He took up a model, so that he could get his equations. Moreover, he caught a foundational idea intuitively, so that he could take a model.

Superball theory is not a numerical theory but a model theory. This theory gets a fundamental idea and then embodies it to a model. This model is named "billiard model". Billiard model, which is a geometrical model, brings many conclusions like algebraic

numerical formulas bring many conclusions.

Does superball theory abandon numerical formulas? No. Superball theory does not abandon numerical formulas but gives foundation for numerical formulas. Of course, these numerical formulas are usually as same as those of current physics. Superball theory does not modify the numerical formulas of current physics but does modify the current idea so that we should not stray in front of paradoxes or contradictions such as "Schrodinger's Cat" or "the difficulty of infinity". We should not mistake the importance of problems. We should attach importance to foundation rather than to superficial figures. We should attach importance to a basic idea rather than to concrete numerical formulas. Then, first of all, I shall show a model.

Billiard Model

Superball theory has the conception of superballs, while superstring theory has the conception of superstrings. Superball theory adopts a geometrical method, while superstring theory adopts a algebraic or numerical method. Superball theory uses some drawn figures, while superstring theory uses some numerical equations.

Superball theory gets an idea or a conception of superballs. This conception comes from the feeling that truth should be expressed as a simple and beautiful model because truth itself must be simple and beautiful. Here simplicity or beauty of truth does not have to be numerical simplicity or numerical beauty. Truth could be expressed by very complicated high-level mathematical formulas but truth should be expressed by a very simple and beautiful model. Truth itself in nature must be simple and beautiful, and therefore the model of truth should be simple and beautiful. I get such a feeling and then I take up a new model, which is named "billiard model". It will be explained in the following sections.

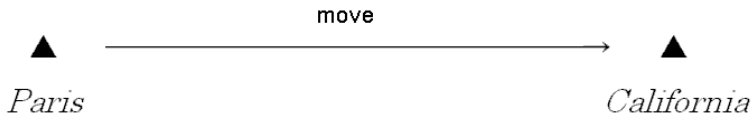
Figures of Tricks

There are two types of tricks that gives misunderstanding or illusion to spectators (observers). The both of (1) (2) are tricks that give spectators illusion instead of the truth.

(1) Trick of Mickey

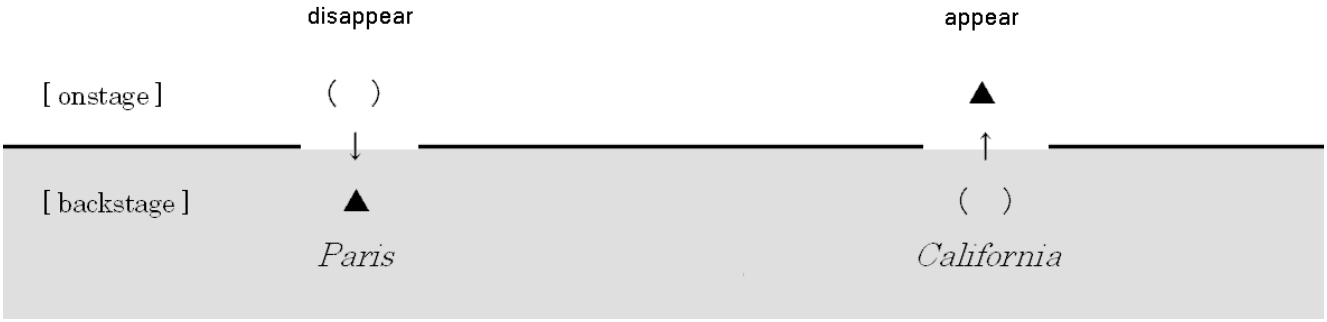
Mickey, a famous mouse, disappeared in Paris and after a moment he appeared in California. Spectators who know this phenomenon are apt to believe that Mickey moved

from Paris to California in a moment. (the following figure)



[fig01]

However Mickey didn't move from Paris to California. In realty, one Mickey disappeared in Paris and another Mickey appeared in California after a moment. (the following figure)

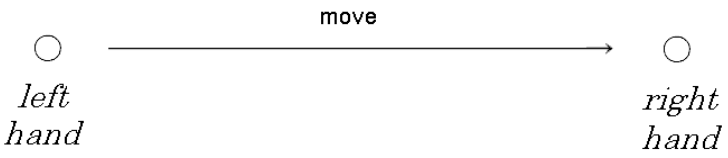


[fig02]

One Mickey disappeared onstage in Paris and another Mickey appeared onstage in California. Spectators who know this phenomenon superficially are apt to believe that Mickey moved from Paris to California in a moment. However, this is illusion.

(2) Trick of Balls

A magician entered the stage and took a ball in the left hand. When he raised a shout, the ball in the left hand disappeared and the ball appeared in the right hand after a moment. Spectators who saw this phenomenon believed that the ball moved from the left hand to the right hand in a moment. (the following figure)



[fig03]

However the ball didn't moved from the left hand to the right hand. In realty, one ball disappeared in the left hand and another ball appeared in the right hand after a moment. (the following figure)

[fig04]

One ball disappeared in the left hand and another ball appeared in the right hand. Spectators who know this phenomenon superficially are apt to believe that a ball moved from the left hand to the right hand in a moment. However, this is illusion.

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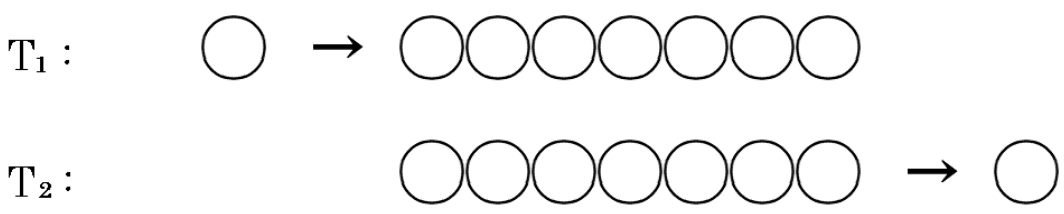
[Supplementary Note]

Each of these two tricks above is named "the trick of movement". The core idea of superball theory is the trick of movement, which cannot be expressed by numerical formulas but can be expressed by some figures.

The Basic Figure

Physicists believe that a quantum moves or travels in space. However this is also an illusion like the illusion of the trick of movement. A quantum gets no movement like Mickey or a ball gets no movement. When a quantum seems to move in space, one quantum disappears at one place and another quantum appears at another place, in fact. This is expressed by the following figure, which is named "the basic figure".



[fig05]

The basic figure means two propositions as follows.

- One ball comes from the left and collides against a row of balls at time T_1

- Another ball springs from a row of balls towards the right space at time T_2

We should pay attention to following three propositions.

- The ball at the left position and the ball at the right position are not the same ball.
- Each ball in a row moves merely very little.
- A spectator who looks at the whole phenomenon feels that one ball moves from the left to the right (i.e. the same ball comes from the left and reaches to the right).

This figure is important because it shows the principle of billiard model. Here, what is expressed by a white circle can be named just "a ball", whose meaning is some stuff that has the form of a sphere.

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[Supplementary Note]

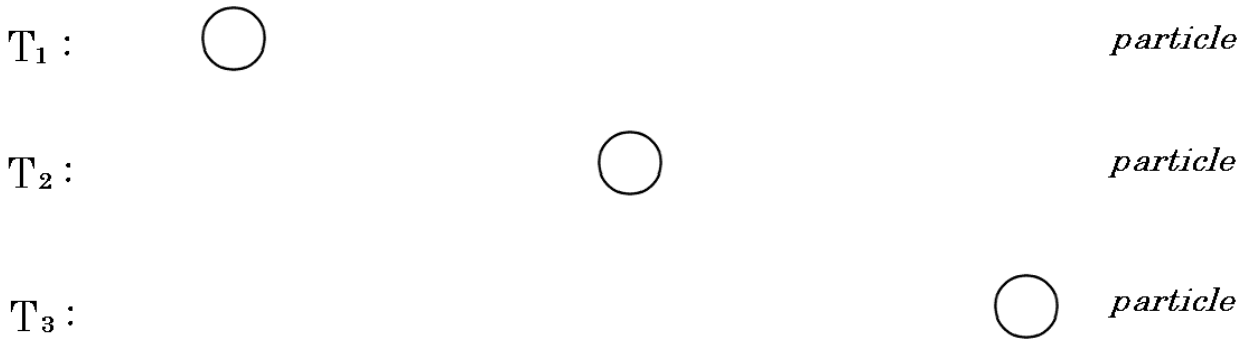
The model that is expressed by the basic figure is named "billiard model". Billiard model is the core of superball theory. Billiard model can be explained by a simile, which is the trick of movement. Both of billiard model and the trick of movement cannot be expressed by numerical formulas but can be expressed by some figures.

Explanation by Billiard Model (1 dimension)

In order to explain the idea of billiard model in detail, I shall compare the conception of billiard model with those of other models, which are the particle theory and the wave theory.

(1) particle theory

The particle theory suggests the movement of a particle, which is expressed by the following figure. (a particle is ○)



[fig06]

When time goes as "$T_1 \rightarrow T_2 \rightarrow T_3$", the position of a particle changes as "$P_1 \rightarrow P_2 \rightarrow P_3$". Here, one particle changes its position when time goes.

(2) wave theory

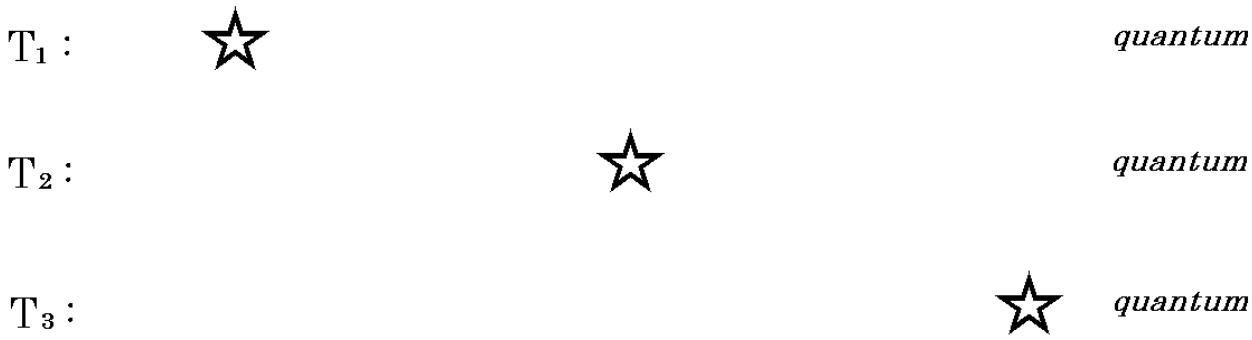
The wave theory suggests the movement of waves, which is expressed by the following figure.

[fig07]

When time goes as "$T_1 \rightarrow T_2 \rightarrow T_3$", the position of a wave changes as "$P_1 \rightarrow P_2 \rightarrow P_3$". Here, a wave changes its position when time goes.

(3) de Broglie wave theory

De Broglie wave theory suggests the movement of a quantum, which is expressed by the following figure.

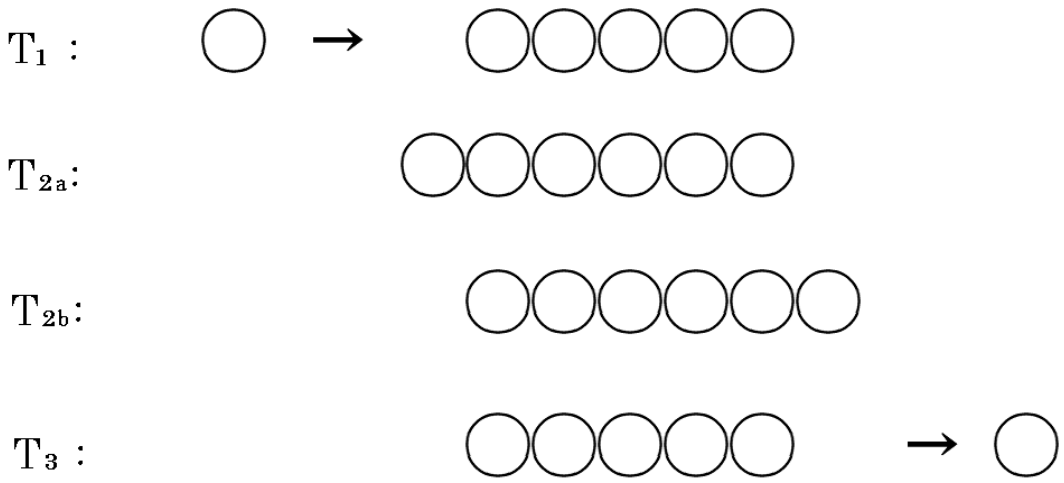


[fig08]

When time goes as "$T_1 \rightarrow T_2 \rightarrow T_3$", the position of a quantum changes as "$P_1 \rightarrow P_2 \rightarrow P_3$". Here, a quantum changes its position when time goes. A quantum has both of a particle's properties and a wave's properties.

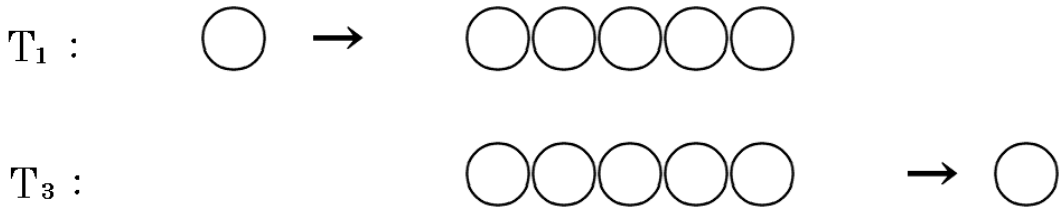
(4) billiard model

Billiard model doesn't suggest the movement of a quantum but suggests the warp of a quantum, which is expressed by the following figure.



[fig09]

There are four lines. You can abandon the second and the third to take only the first and the fourth so that you could combine the first and the fourth and make the following figure.



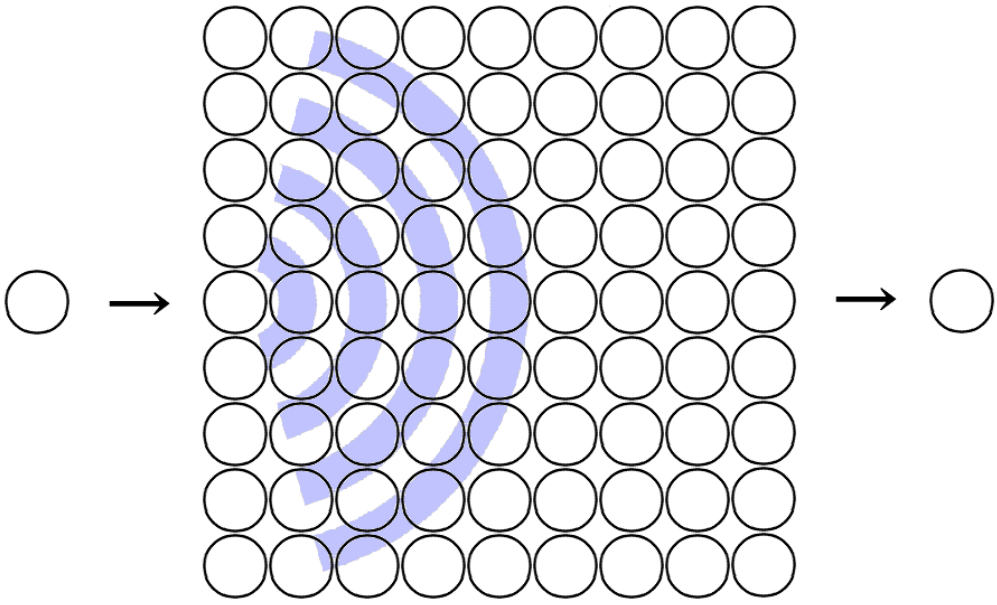
[fig10]

This figure is as same as a previous figure (the basic figure). See this figure to find that each quantum doesn't move. Then, we should pay attention to the followings.

- The quantum at the left travels only a short distance before it collides against the row.
- The quantum at the right travels only a short distance after it springs from the row.
- Each ball in the row doesn't travel in a macro space but only vibrates in a micro space.
- The row consists of many balls and has very long distance. No ball can travel this long distance but the vibration of balls can be transmitted in the row of long distance.

Explanation by Billiard Model (2 dimensions)

In order to explain the idea of billiard model more, I shall expand this model. The preceding figure is based on 1 dimension but the coming figure is based on 2 dimensions.



[fig11]

This figure shows that the vibration of balls can be transmitted in the whole plane. This figure also express a new idea: the idea of "waves of balls". What we call a quantum should be regarded as waves of balls instead of mere waves or a mere particle. Billiard model has the following conception.

"There are many balls in vacuum. The whole of them should be the medium of waves."

This is plainly expressed by the simile of a human wave. Many spectators in a soccer stadium sometimes stand up one after another and then sit down one after another in succession so that a big human wave occurs. When a human wave moves, each spectator doesn't move to another place but does just stand up and sit down in the same place. However, it seems that something moves with the big wave.

A human wave is a simile of the movement of a quantum. When a quantum seems to travel a long distance, each ball just vibrates in its own position while waves of balls are transmitted in the long distance.

Warp

When a quantum seems to travel a long distance, no particle moves but one particle disappears in one place and afterwards another particle appears in another place, in fact. This phenomenon looks like the movement of a particle but is not the movement of a particle. This phenomenon should not be called "movement" and therefore I name it "warp of quantum" or just "warp".

A quantum doesn't move from position X to position Y but does warp from position X to position Y. We can understand this explanation by billiard model. Then, we should pay attention to that the quantum at position X and the quantum at position Y are not the same. Both the quanta are not the same one quantum but are different two quanta. We are apt to believe they are the same but in fact they are not the same but merely indistinguishable. This indistinguishableness of quanta gives us illusion as mentioned before.

Conversion of a Particle and Waves

In order to understand what is a warp, we could see the following figure.

[fig12]

One particle existed at the starting point and another particle will exist at the end point, while waves are transmitted in the space between both points. This process can be written as the following schema.

particle → wave → particle

This schema means that a particle converts itself to waves and afterwards waves convert themselves to a particle. There is mutual conversion between a particles and waves. This mutual conversion should be named "conversion of a particle and waves". The conversion of a particle and waves has two types. One is the conversion from a particle to waves, while the other is that from waves to a particle.

When we think of conversion of a particle and waves, we should pay attention to the following two propositions.

- A particle exists only in a very narrow area.
- Waves exist in broad area in space.

We could understand both the propositions if we apply them to an experiment: the double-slit experiment. In this experiment, a particle exists in a very narrow area of the starting point or the end point, while waves exist in broad area in the space between two points.

Summary of Billiard Model

- The foundation of superball theory is a model that is named "billiard model".
- Billiard model explains how a quantum moves or travels in a space.
- Billiard model suggests that a quantum's movement is not one phenomenon as a particle's movement but two phenomena which consist of disappearance and appearance. When a particle disappears in a place and afterwards another particle appears in another place, observers regard these two phenomena as a phenomenon of one particle's movement.
- Billiard model regards a moving quantum as waves of balls instead of mere waves or

a mere particle.

- A quantum that moves rapidly has the properties of waves, while a quantum that stands still has the properties of a particle.
- When a quantum moves, it changes its form in the order such as "particle → wave → particle". This means that one quantum can have three forms: the form of a particle at the starting point, the form of waves in the intermediate space and the form of a particle again at the end point.
- When a quantum travels, no particle moves from the starting point to the end point but every superball in the space vibrates a little at its own position. This vibration of micro size is transmitted from the starting point to the end point in the space. This transmission is wave motion or waves.
- When a quantum has the form of a particle, it exists in a narrow area. When a quantum has the form of waves, it exists in a broad area of the space.
- Every quantum can convert itself from the form of a particle to the form of waves and also can convert itself from the form of waves to the form of a particle. These conversions of both directions is named "the conversion of a particle and waves". When this conversion occurs, the area where a quantum exists also changes the size. For example, when a quantum converts itself from the form of a particle to the form of waves, its area also changes the size from a small size to a large size: i.e. from a narrow range to a broad range.
- These process mentioned above can be explained by the billiard model.

Existence of the Ether

Billiard model is no more than a model. The problem whether it is proper or not can not be solved immediately. We should verify this model by checking whether or not superballs in this model accord with real quanta.

Three Conditions of Superballs

Do superballs accord with real quanta in this world? Let's investigate this problem.

Firstly let's suppose that superballs accord with real quanta. Then we can call quanta superballs. This means we can have the assumption that real quanta should be regarded as balls of billiard model.

When we have the assumption above and seek some conditions which superballs must meet, we would find three conditions as follows.

- equivalence of superballs
- filling of superballs
- variableness of superballs

Let's consider these conditions one by one.

Equivalence of Superballs

In order that we can regard quanta as balls of billiard model, quanta must meet the following condition

"All the quanta of a kind are equivalent and indistinguishable each other."

This condition is named "equivalence of superballs". For example, in the double-slit experiment, the electron at the starting point and the electron at the end point are equivalent and indistinguishable. (though they are not the same.)

Generally saying, in the process of "particle → wave → particle", the first particle and the last particle are indistinguishable. This is equivalence of superballs. Of course, we can regard equivalence of superballs as equivalence of quanta. Electrons in the world are indistinguishable each other. This has turned out to be true in current physics.

If equivalence of superballs is right, we cannot distinguish the following two phenomena.

- "An electron moves from the starting point to the end point"
- "An electron warps from the starting point to the end point" (i.e. one disappears at the starting point and another appears at the end point.)

We may regard both phenomena as the same phenomenon because indistinguishableness of superballs brings indistinguishableness of phenomena. After all, the phenomenon that we call the "movement of quantum" can be regarded as the "warp of quantum", in essence.

Filling of Superballs

In order that we can regard quanta as balls of billiard model, quanta must meet the following condition

"The space, which we call vacuum, is not empty but is filled with superballs."

This condition is named "filling of superballs".

Can filling of superballs be right in reality? Yes, it can be. We have realized the phenomenon of pair creation, which means that vacuum always creates pairs of quanta (a

particle and an antiparticle). If this is true, vacuum is not empty but is filled with particles and antiparticles of the same number. These particles and antiparticles may be regarded as superballs.

We can interpret this idea as another idea of billiard model, so that we should draw the idea as the following.

[fig13]

In this figure, particles are shown as white circles while antiparticles are shown as black circles. Particles and antiparticles stand in a row alternately and they vibrate to transmit waves from the left to the right.

Particles and antiparticles exist in the same number and they nullify themselves because a pair of a particle and an antiparticle does the opposite of pair creation (i.e. pair extinction). A observers, who gets a standpoint of a macro view, would observe nothing and therefore he would feel that there exists nothing. However, there must exist many balls even though they are invisible.

Variableness of Superballs

A superball is not something that exists as a specific particle or as a specific antiparticle. A superball can be a superball of any type (i.e. any quantum). A pair of superballs can be a pair of a particle and an antiparticle of any quantum. For example:

- electron *and* positron
- meson *and* antimeson

Superballs can be electrons *and* positrons, mesons *and* antimesons, and so on. Superball theory suggests that a superball is not something that is fixed in a specific form but is something that is variable. A superball is not fixed specific substance in reality but is something that could named "supersubstance". A superball can be an electron at a time, while it can be a meson at another time. No superball should be a fixed quantum such as an electron or a meson. A superballs is a variable existence. This condition is named

"variableness of superballs". Figuratively speaking, sounds get various tones by frequency.

Variableness of superballs might seem to be unnatural but is never unnatural. Variableness of superballs means just that superballs are not substance: i.e. vacuum is not substance. This is natural, of course.

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[Supplementary Note]

You can suppose that superballs have some unknown variables so that a superball could change the kind by the change of such variables.

Vacuum and the Ether

We have understood three conditions above and now we can conclude as follows.

"Vacuum is not empty but is filled with superballs which are equivalent each other. Superballs correspond to any kind of quanta. For example, electron *and* positron, meson *and* antimeson."

Superball theory regards vacuum as the space that is filled with superballs. Therefore we can use another word different from "vacuum". Let's use the word "the ether". Vacuum can be called "the ether", too. What is the ether? It is, according to superball theory, the space which is filled with superballs.

The ether by superball theory resembles the ether by physics in 19th century, however, they are different because the former is not substance while the latter is substance. Physics of 19th century regarded the ether as substance that had mass and gave some resistance to the movement of bodies. However, the ether of superball theory is not substance but is vacuum. Vacuum has no substance but has just superballs, which are usually invisible and give usually no resistance to the movement of bodies.

Why are superballs usually invisible? It is because static superballs as vacuum are invisible and moreover a rapid quantum is also invisible. Rapid quanta have the form of waves, which are invisible in vacuum. (However, when a rapid quantum as waves loses its speed, it converts its form from waves to a particle. This process is as mentioned before.)

Vibration and Rotation

Superball theory suggests that superballs should vibrate. Then, what is the vibration? How do superballs vibrate? How does the ether transmit waves? Let's consider this problem.

Rotation and Vibration

Superballs do vibrate. It's as billiard model explains. Then, what is the vibration?

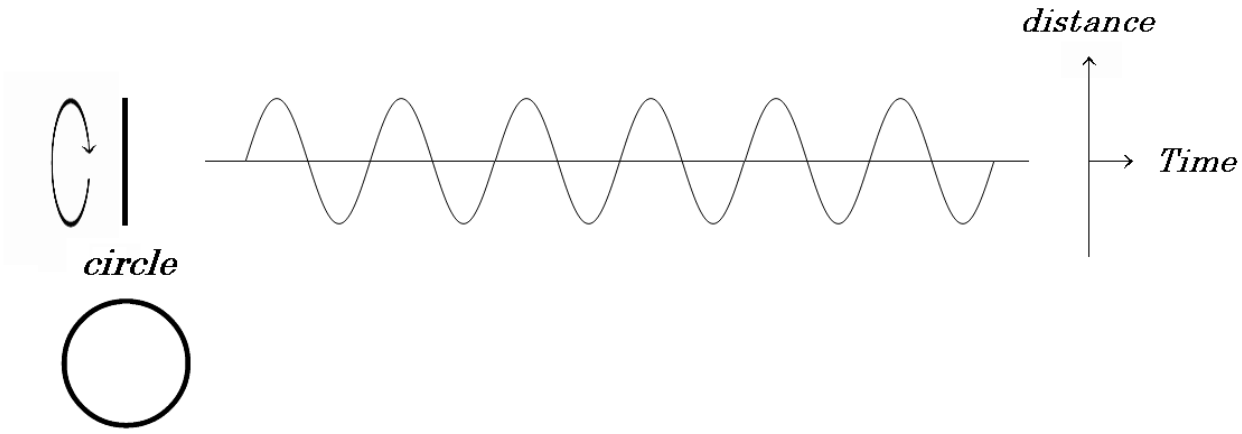
Usual vibration can be represented by a sine function, while a sine function can be represented by a complex function such as e^{ix} . And then, we could get the following suggestion.

"The vibration in the real number world should be represented by a sine function. The rotation in the complex number world should be represented by a complex function such as e^{ix}. Both of them are equivalent."

Superball theory takes this suggestion to put a relation between the vibration and rotation, so that it also takes the following suggestion.

"A superball is a ball of complex numbers. When a superball rotates, its real part appears to be a sine function"

This proposition can be expressed by the following figure.



[fig14]

Look at the left part of this figure. The vertical line as " | " means a circle viewed from its side. This circle stands on the paper perpendicularly, while this perpendicular direction has the dimension of imaginary numbers. When this circle rotates, the position of each point on the circle arc moves in the vertical direction. This vertical movement can be drawn as a sine curve in the plane that has 2 dimensions of distance and time. This vertical movement is vibration.

There is a circle in this figure. If there is a ball instead of a circle, superball theory explains in the same way. When a balls rotates, the position of each point on the ball surface vibrates in the vertical direction.

If we understand the meaning of the figure above, we could regard a superstring as the

real part of a superball. Why so? When each point of a superball rotates in the complex number world, each point of a superstring vibrates in the real number world. That's the reason.

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[Supplementary Note]

Superstring theory and superball theory are different theories because of two reasons. Firstly, superstring theory regards vacuum as an empty space, while superball theory regards vacuum as the ether which is filled with superballs. This difference comes from another difference whether or not it takes billiard model. Secondly, superstring theory regards vacuum as a space of real numbers, while superball theory regards vacuum as a space of complex numbers.

The latter reason is important. It suggests that our cosmos must surely consist of complex numbers. Complex numbers are not merely a convenience for calculation but are basis of our cosmos. If our cosmos loses complex numbers, our cosmos must collapse because it must lose the ether. This topic will be taken again later. (with the topic of the complex ether.)

Rotation and Existence

Superballs are balls of complex numbers, which are different from balls of real numbers. Then what is the difference in essence?

Let's remember that the ether is filled with superballs, which can be regarded as particles and antiparticles. This means that vacuum is filled with particles and antiparticles, and that a superball always changes its form into a particle or an antiparticle. If we could have this idea, we should have the following suggestion.

"Superballs rotate to change phases. When the phase of a superball takes the top position, this superball changes its form into a particle. When the phase of a superball takes the bottom position, this superball changes its form into an antiparticle."

If a superball rotates, it must change the phase so that e^{ix} changes between +1 and -1. The value +1 corresponds to a particle and the value -1 corresponds to an antiparticle.

Then, what about an intermediate value between +1 and -1? We could have the following suggestion.

"When the phase of a superball is intermediate, this superball goes out of the real-number world and comes into the imaginary-number world."

This means the followings.

"When a superball rotates, it goes out and comes into between the real-number world and the imaginary-number world."

This means our cosmos must have two parts: the real-number world and the imaginary-number world. A particle should alternately go out and come in between both parts as it rotates. Then, we can take a concrete idea as the following.

"When waves are transmitted in vacuum, particles and antiparticle vibrate in vacuum. Their vibration means the real part of the rotation of superballs. There is no particle that vibrates and travels a long distance, but there are waves that are transmitted in a long distance. Waves occurs when each superball rotates at its position in the ether of complex numbers. The rotation of a superball in complex-number world means the alternate change between a particle and an antiparticle in real-number world. A superball comes to be a particle or an antiparticle only when its phase comes to be top or bottom(+1 or -1). A superball comes to be a intermediate existence between a particle and an antiparticle when its phase comes to be the middle between top and bottom. This intermediate existence is not substance in real-number world but is something in complex-number world."

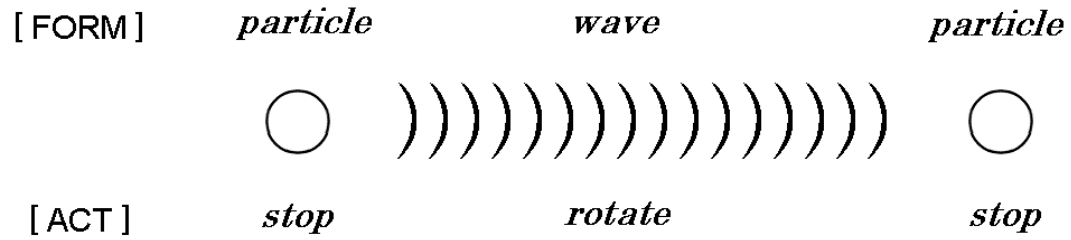
This idea makes a contrast with that of current physics, which usually regard a quantum as something that always belongs to our real cosmos. If a quantum is always a particle that exists at a spot in our real cosmos, it cannot be intermediate existence and therefore it cannot be waves that exist in broad space. But this conclusion is inconsistent with experiments. For example, let's suppose double-slit experiment. Most physicists regard a quantum as something that exists in a narrow spot and therefore they think that a quantum should pass through a narrow space of one slit in double-slit experiment. However, as you know, this idea is inconsistent with the experiment in fact. Then, many physicists think that one particle passes through two slits at the same time: i.e. a particle is one existence and two existence at the same time. However, this interpretation cannot be valid because it has a numerical contradiction of a stupid who cannot count numbers. Of course, all of these problems come from an illusion -- the illusion that a quantum must always be a real particle which exists in a narrow spot.

Rotation and Stop

We have understood the mentioned above and now can take the suggestion as follows.

"Substance consists of particles which should be regarded as superballs of top phase, while antisubstance consists of antiparticles which should be regarded as superballs of bottom phase. Substance or antisubstance consists of particles or antisubstance which should be regarded as superballs of a fixed phase. This means that a superball doesn't rotate but stop when a quantum has the form of a particle or an antisubstance, and that a superball does rotate only when a quantum has the form of waves.

The suggestion above can be represented by the following figure.



[fig15]

Now we could realize that the rotation of a superball does not mean the rotation in the real world. It is not a spatial rotation such as the rotation of sports ball but a rotation of the value for existence. This rotation is not a visible motion but a abstract change.

Comparison with Empty Hole Theory

Superball theory suggests that the ether is filled with superballs. This idea is different from the "empty hole" theory of Dirac. Let's compare them.

Dirac's idea is based on the particle theory and it suggests that vacuum is filled with a sort of particles. Superball theory suggests that vacuum or the ether is filled with superballs. Particles are always substance but superballs are not always substance.

Then, what determines whether a superballs come to be a substance or not? It is just the phase of the superball. A superball comes to be substance when its phase comes to be top. Only the phase determines it. If you think that a superball as substance sometimes exists in empty space, you are misunderstanding. The ether is full of superballs. Superballs always exist in the space. It is only the phase of a superball that determine whether a particle exists or not. It's not the existence of a superball.

Then, what is an antiparticle? It is just a superball of the specific phase: bottom. Of course, an antiparticle is not an empty hole in the ether.

Wavelength and Amplitude

The rotation of a particle and the rotation of a superball are different, even if both of them have the same word. For example, an electron in the real world rotates in the Euclid space of 3 dimensions, while superball rotates in the ether of complex numbers.

The rotation of a superball could be named the "ethereal rotation" in order to be distinguished from the rotation of a particle in the Euclid space of 3 dimensions. However,

it should be called the "ethereal rotation" only when that's necessary and it should be called just the "rotation" in usual.

The rotation of a superball doesn't corresponds to the rotation of a particle but does correspond to the vibration of a quantum. Then what is the vibration of a quantum?

The vibration of a quantum causes waves of the ether, while waves have wavelengths and amplitudes. Then, what are wavelengths and amplitudes?

Let's consider the meanings of wavelengths. For example, an electromagnetic wave has the wavelength of 1 meter. This wavelength means the following.

"The distance which an electromagnetic wave travels while the superball of an electromagnetic wave does rotation in a cycle."

This electromagnetic wave travels 1 meter while a photon (an electromagnetic superball) rotates in a cycle. It needs a very short time. A photon travels 1 meter in that short time. This distance of 1 meter is the meaning of the wavelength. Of course, wavelengths of superballs belong to the Euclid space that has 3 real dimensions. It's important.

Let's consider the meanings of amplitudes. Remember that waves of air have amplitudes of real numbers. However waves of the ether have amplitudes of complex numbers. When waves of sound occur, each molecule vibrates and has its amplitude. When waves of superballs occur, each superball rotates and has its amplitude.

Therefore, perhaps, the amplitude of a superball in the ether would be the width of the rotation of superballs. It would be the range where superball can rotate. It would be the size of the ether. -- These are not sure. It's a problem.

This problem is somewhat difficult to solve. We must understand the properties of the ether more and more before we deal with this problem.

Dimensions of the Ether

The ether has dimensions. Then, what dimensions are they?

To tell the conclusion first, the ether should have 6 micro dimensions of complex numbers. This means that our cosmos has 10 dimensions, which consists of 3 macro dimensions of the Euclid space, 1 macro dimension of time and 6 micro dimensions of the ether.

Superball theory gives the conclusion above and the reasons will be explained in the following sections.

The Ether of Complex Numbers

As mentioned before, superballs are balls of complex numbers. Therefore the ether of superballs should have dimensions of complex numbers. In other words, the ether should have dimensions of real numbers and dimensions of imaginary numbers.

To emphasize this, we can call the ether "the complex ether". Of course we may call it just "the ether". Both have the same meanings.

Does the complex ether exist in our cosmos ? Otherwise, is the ether merely fictitious stuff of a fictitious model for the convenience of calculation? In other words, does our cosmos exist as the Euclid space of 3 dimensions or exist as a more complicated space that has more dimensions of complex numbers? In order to answer this problem, we should consider the meanings of Schrodinger's equation.

According to usual ideas of physics, our cosmos is a space which has 3 dimensions of real numbers while the functions of complex numbers are used for the convenience of calculation. The meanings of wave functions is regarded as follows.

"The square of the absolute value of a wave function gives the probability of the existence (of a particle)."

This explanation suggests that importance is only the absolute value of the wave function. If so, only the real number as the absolute value of the wave function has significance and therefore we don't have to consider a wave function of complex numbers as itself. Meanwhile, if we consider only the absolute value of the wave function, we can not explain well such phenomena as interference of wave functions. (Remember the double-slit experiment.)

According to ideas of superball theory, our cosmos should be a space which has 10 dimensions of complex numbers in essence. 3 dimensions of them are just a part of it, while 6 dimensions of them as the dimensions of the ether are more important. The ether, which transmits the waves of superballs, is something that has complex numbers in our cosmos. And therefore wave functions should have complex numbers naturally.

*

[Supplementary Note]

A wave function has the real part and the imaginary part. This could give the following suggestions.

- A wave function is expressed as the sum of the real part and the imaginary part.
- Only the real part of a wave function can be observed and the imaginary part can not be observed.
- When a superball rotates, each of the real part and the imaginary part of a wave function changes its value as a sine function (or a sine curve).

- We can observe only the real part of a wave function, which shows the vibration of a sine curve.
- Usually we can not observe even the real part of a wave function as a particle because a wave is not a particle in a narrow area.
- Real waves are only the real part of the complex ether. The complex ether doesn't consist of particles that are expressed by real numbers but does consist of superballs that are expressed by complex numbers.
- The essence of a wave function is not the vibration of the real part or the imaginary part but the rotation of superballs.
- The sum of the real part and the imaginary part of a wave function means the whole energy of a quantum.
- The whole energy of a quantum exists in a broad area of the space. The energy of the wave function at a narrow area is expressed as the square of the absolute value of a wave function. This absolute value means the density of energy in the complex ether.
- When a wave function changes its value from a complex number to a real number, superballs that corresponds to the wave change their value from complex numbers to real numbers.
- The proportion of the real part and the imaginary part means the phase of a superball.
- A superball comes to be substance when its real part of the wave function comes to be 1 (i.e. its phase of the wave function comes to be top.)

As mentioned above, a wave function means the density of energy in the complex ether rather than the probability of the existence in the real space. The higher grows the density of energy, the higher grows the probability of the conversion (from waves to a particle). This probability looks like the probability of existence of a particle.

Dimensions of the Complex Ether

Then, what dimensions does the complex ether have? This is our problem. Firstly, we unsurely suppose the following.

"The ether has 3 dimensions of imaginary numbers that are perpendicular to 3 dimensions of the Euclid space of the cosmos."

If so, the ether should have 6 dimensions that consist of 3 real dimensions and 3 imaginary dimensions. They can be written as x,y,z of real dimensions and ix,iy,iz of imaginary dimensions. These dimensions give such a space.

"The Euclid space of 6 dimensions"

However, this space as a model is not appropriate because of some reasons that shall be explained in the following sections.

The Sizes of Dimensions

As mentioned before, superballs rotate in the complex ether. That's enough. Superballs don't have to travel in the complex ether. Let's suppose a space of only a couple of dimensions: for example, u and iu. Superballs should rotate in the complex plane of u and iu. In this case only micro vibrations occurs in the dimensions of u and iu when superballs rotate.

This means that the dimensions of the ether needs only the size of vibrations (of the real part or the imaginary part) of superballs. This size should be almost the plank level.

"The dimensions of the ether need just the size of almost the plank level."

This condition is one of the properties of the ether. If we get this condition, the model of the Euclid space of 6 dimensions has too big imaginary dimensions to be appropriate.

Moreover, if 3 imaginary dimensions has micro size, real dimensions and imaginary dimensions must have different size. That's unnatural and inconceivable. Therefore, both dimensions should have the same size. For example, u and iu should have the same size.

Dimensions as Rectangular Coordinates

The mentioned above gives the following conclusion.

"The dimensions of the complex ether cannot be equal to 3 real dimensions (x,y,z) of the Euclid space nor to their imaginary dimensions (ix,iy,iz)."

Let's write one dimension of the ether as u. This u is a dimension completely different from x,y,z and therefore u is rectangular to x,y,z.

Superballs are balls of complex numbers. If superballs have a real dimension u, they should have an imaginary dimension iu. Both of u and iu are rectangular to x,y,z, of course.

Thus we can get the conclusion that the dimensions of the ether are rectangular to 3 real dimensions of the Euclid space. Now, let's call the dimensions of the ether "micro dimensions" and call the dimensions of 3 real dimensions of the Euclid space "macro dimensions".

The number of Dimensions

Dimensions of the complex ether are expressed in a way such as *iu* and *iu*. However these two dimensions (as micro dimensions) would not be the all. Then, how many dimensions does the complex ether have? The model of superballs cannot determine this number, while phenomena in the real world could determine it somewhat. Consequently, we could take the following presumption.

"There are 3 types of waves of superballs: electromagnetic waves, waves of weak interaction, waves of strong interaction. These 3 types of waves should have their own dimensions of real numbers."

If so, the ether should have 3 real dimensions for 3 types of waves. Moreover, the ether should have imaginary dimensions which correspond to real dimensions. Therefore the ether should have 3 dimensions of real numbers and 3 dimensions of imaginary number. i.e. The ether should have three couples of dimensions of a real dimension and an imaginary dimension.

Thus the ether should have 6 dimensions, whose sizes are almost plank level. We can write them such as *u,v,w,iu,iv,iw*. Meanwhile, our cosmos has 3 macro dimensions and 1 dimension of time. They are, so to speak, ordinary dimensions. To sum them up, our cosmos should have 10 dimensions: 4 ordinary dimensions and 6 micro dimensions: such as *x,y,z,t,u,v,w,iu,iv,iw*.

*

[Supplementary Note]

The idea of complex dimensions of micro size comes from the idea of superballs. A superball is a ball which is a symmetrical shape and therefore its complex dimensions should have the same size.

If a superball is not a ball but is an unsymmetrical shape, a superball can have dimensions of different sizes, especially *u* and *iu* of different sizes. If you took such an unsymmetrical model, you would build another theory and perhaps would get insufficiency or contradiction to reality. I will not take up such an unsymmetrical model, because I believe nature is beautiful and symmetrical.

All the dimensions of the complex ether should be the same micro size because of the symmetry of the shape of a superball. However, this restriction should not be applied to 3 macro dimensions. Our cosmos should not have imaginary dimensions of macro size such as *ix,iy,iz*. The reason is explained before.

Relations with Current Theories

Superball theory, as a theory that gives us an appropriate model for quanta, has been explained almost enough. Then let's compare the ideas of this theory to the ideas of current physics. When we look over the history of physics, we can find interesting ideas which have different forms: various forms such as equations, principles or models.

Maxwell's Model

If you look over the history of physics, you can find a model that resemble the model of superballs. This model is supposed by Maxwell. He thought up this model for electromagnetic wave and then he did concrete the equation of electromagnetism.

Maxwell's model is not well-known and I wish if I could explain it briefly. However it is so complicated that I can explain only the core or the main point with the following conception.

"Rotating micro balls, which should fill the space and should meet with certain conditions."

Of course, these conditions means Maxwell's equations, which are well-known. However, importance is his first idea as the basis of his conception. It's the idea of micro balls. The idea of micro balls is somewhat similar to the idea of superballs. This similarity means that both of the idea of micro balls and the idea of superballs are never absurd.

Moreover, we should pay attention to his method. Maxwell took up a concrete model firstly and constructed his numerical equation secondly. He thought up his model first of all and afterwards he just formalized it. Thus he could get numerical formulas known as Maxwell's equations. The order is not reversal. It is not true that he picked up numerical equation firstly and look for a concrete model secondly. If he had intended to take up such a reversal way, he would not find his equations. We should regard on his method.

Feynman's Path Integral

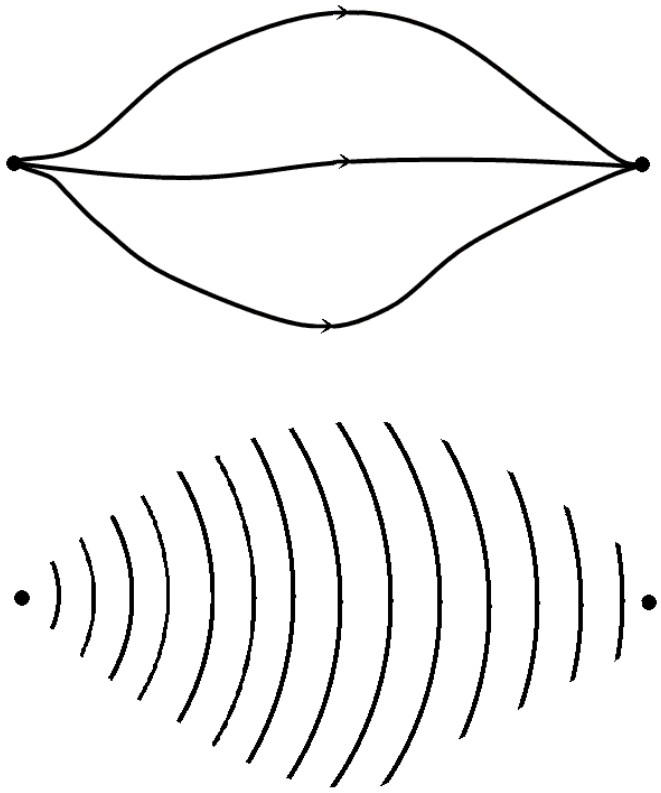
Feynman's path integral and billiard model get along well with each other. In essence, Feynman's path integral is almost equivalent to the formalizing of billiard model.

In history, many scientists got model firstly and numerical formulas secondly as Maxwell did. So did Feynman. He supposed a model of a particle which travels infinite path at the same time. To be more precise, a model of infinite molecules (i.e. infinite pieces of a broken

particle) which travel infinite paths. Of course, this model gives an integral as a sum of molecules, which is Feynman's path integral.

However, this model doesn't meet with ordinary theories: the particle theory, the wave theory, de Broglie wave theory. This model could not be readily recognized by physicists, because most of them believed the particle theory.

Superball theory now gives another model for Feynman's path integral. It's billiard model. This model can be a model of Feynman's path integral. Billiard model and the path integral got along well with each other. However they have one difference in their ideas. You can understand it if you look at the following figure.



[fig16]

There are the starting point at the left and the end point at the right. Let's call the direction from the starting point to the end point "strait" and call the direction that is perpendicular to the former direction "cross". Cross means the direction of a wave's arc.

If you take up the path integral, you should calculate the value of a path on straight firstly and integrate the value on cross secondly. The order is "straight → cross".

If you take up billiard model, you should calculate the value of a wave on cross firstly and integrate its value on straight secondly. The order is "cross → straight".

Both calculations have different orders but the last values as results are the same. This would be apparent because of the properties of an integral in Mathematics.

After all, billiard model and the path integral have equivalent meanings in essence.

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[Supplementary Note]

You might think that the path integral and billiard model would have another difference. The end point of the path integral is determined to be one point, while the end point of billiard model doesn't seems to be determined to be one point. The latter is not true. The end point of billiard model is determined to be one point. However, this point is not determined uniquely but is determined just by probability. You should pay attention to that the process of billiard model has two conversions: the conversion of "particle → wave" and that of "wave → particle". Each conversion means a half of the process. The end point is not determined in the former half process but is determined in the latter half process. After all, when a particle does a warp, the end point where the particle seems to reach is determined by probability. (though we are apt to be in confusion.)

Double-slit Experiment

Superball theory can resolve the paradox of the double-slit experiment. Of course, this paradox is the following.

" It is unnatural that one particle passes trough two slits at the same time while one particle must exist in a narrow area."

Superball theory doesn't have this paradox in essence because superball theory suggests that a rapid quantum is not a particle but waves of superballs. A particle must exist in a narrow area, while waves don't have to exist in a narrow area and can exist in a broad area. Thus there is no contradiction if we suppose that waves are transmitted through two slit at the same time.

The paradox above comes from the idea that a quantum must be a particle which has the properties of waves. It is the idea of de Broglie wave. However superball theory has another idea, which suggests that a quantum can convert its form. This idea suggest that a particle is not always a particle. A particle can convert itself to waves and waves can convert themselves to a particle.

Moreover, the idea of billiard model brings a natural conclusion as the following.

"Waves of superballs should brings about the interference in the double-slit experiment because these waves are not a particle but waves."

An electron that stands still can be regarded as a particle but an electron that seem to travel rapidly in the space must be regarded as waves. Thus the double-slit experiment pick up and emphasize a special property of quantum.

Most physicists believe that a quantum has always one form. They can observe a particle at the starting point and a particle at the end point. Therefore they believes that a quantum as a particle passes through two slits at the same time. However, superball theory

suggests that a quantum can have different forms: the form of a particle at the starting point, the form of waves in the middle space, the form of a particle at the end point.

A quantum can have different forms. A quantum changes its form. Even if a particle seems to travel the space, no particle travels but just one particle disappears and another particle appears. There is no particle that travels in the middle space. Scientists who observed this phenomenon are apt to be tricked by nature. Billiard model discloses the secret of this trick.

Schrodinger's Cat

Superball theory can resolve the paradox of Schrodinger's Cat.

Superball theory is effective only in the world in which the equivalence of superballs is valid: i.e. in the micro world. Meanwhile, in the macro world, the equivalence of substance (instead of the equivalence of superballs) is not valid.

For example, many protons are not distinguishable in the micro world, while many real cats are distinguishable in the macro world. An electron can be produced in vacuum in the micro world, while a real cat cannot be produced in vacuum in the macro world.

The idea of quantum mechanics can be applied only in the micro world in which the model of superballs is valid. A quantum in the micro world can have an undeterminable state, while a cat in the macro world must have a determined state. A quantum has an undeterminable state when it takes the form of waves, while a cat has always a determined state. An undeterminable state can come to be one of some states, while a determined state must be its state.

An undeterminable state is not the superposition of determined states. An undeterminable state is not the composition of determined states. Waves is not the composition of particles. Waves and particles have a specific relation. That's what superball theory suggests.

Difficulty of Infinity

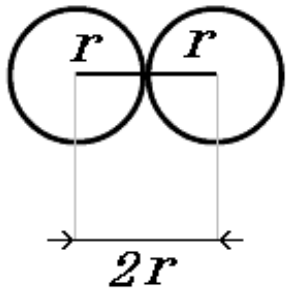
Quantum mechanics of today has a problem: the difficulty of infinity. However, superball theory can solve this problem and explain why this problem occurs. The reason is as follows.

"The difficulty of infinity comes from unlimitedness of quantum mechanics, which cannot tell its own valid range and therefore it inevitably includes a small range where it is invalid. In this small range, quantum mechanics is invalid and puts some vacant

conclusions. Thus the invalid range brings a vacant conclusion which gives contradiction."

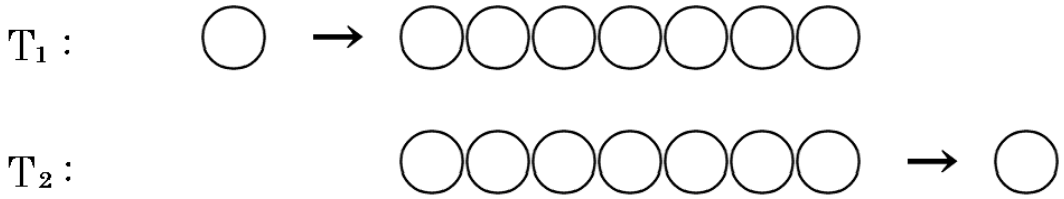
Quantum mechanics cannot tell its own valid range. This is core of this problem. In reality, quantum mechanics has its own valid range. This range should exclude a very short distance (between two particles). Why so? Quantum mechanics gives no answer but superball theory gives a reasonable answer.

A superball is not a point but a ball, geometrically. A quantum is not a point of no volume but is a ball of some volume. A couple of points can approach each other in a very short distance almost zero, while a couple of balls cannot approach each other in very short distance but can approach each other in a certain distance. What's the distance? It must be longer than the diameter of a superball. The reason can be explained by the following figure.



[fig17]

The distance between two balls must be longer than *2r*, which is the diameter of a ball or the double radius of a ball. The idea of waves are valid only in the distance longer than the diameter of a ball. We can understand it well by the following figure.



[fig18]

A couple of superballs cannot approach each other in the distance nearer than their diameter. Waves can occur only when this distance is more than their diameter. Thus we can realize the range in which quantum mechanics is valid.

Quantum mechanics should be invalid if the distance between two quanta is less than the diameter of a quantum. If so, the integral around a point has no sense. Such a calculation is

nonsense. Therefore, the difficulty of infinity doesn't occur if we take up superball theory. Superball theory tells the lower limit of quantum mechanics.

Heisenberg Uncertainty Principle

The uncertainty principle of Heisenberg and the uncertainty principle of superball theory are not the same. Both of them have the same name and are almost same, however, they have one difference: the difference of ranges. The former has no limit but the latter has a upper limit. Superball theory suggest that the uncertainty principle is valid if the size is under the upper limit. What's the upper limit? It is the size of micro dimensions, which would be almost the size of plank constant. The reason is as follows.

First of all, we would wonder what is the essence of the uncertainty principle. Let's consider. A superball should always rotate somewhat, so that its real parts should always fluctuate. This fluctuation means the vibration and it means the uncertainty of a quantum, too.

I will explain it figuratively. Suppose that a bicycle moves at a constant speed. Each point of the bicycle appears to move at a constant speed if an observer looks at it from a distance. However, in reality, each tire always rotates, so that it fluctuates each point of a tire. Each point of a tire changes some values: the horizontal position, the vertical position, the momentum, the potential energy, and so on. These values are always changing, though each of them can be neglected if an observer stands in a distance and look at the whole phenomenon roughly.

A superball resembles a tire of a bicycle. A superball usually rotates somewhat, so that it fluctuates its some values: positions, momentum, and so on. These values are always changing, however, each of these values is limited under a certain size, which is almost the size of plank constant. That's the uncertainty principle given by superball theory.

Heisenberg uncertainty principle suggests that the product of fluctuations of two variables (e.g. position and momentum) is greater than the plank constant. So does the uncertainty principle given by superball theory.

Moreover, the uncertainty principle given by superball theory suggests that not only the product of fluctuations but also each value of fluctuations should be greater than a certain size. (about plank constant.)

The difference between the uncertainty principle of Heisenberg and the uncertainty principle of superball theory can be expressed obviously by another difference. It's the difference of conclusion.

Heisenberg's theory suggests: "If the value of fluctuations of the momentum shrinks to zero, the value of fluctuations of the position grows to infinity."

Superball theory suggests: "The value of fluctuations of the momentum should never shrink to zero, so that the value of fluctuations of the position should never grow to infinity."

The former concludes that the position of a quantum can fluctuate infinitely because the value of fluctuations of the momentum can shrink to zero. The latter concludes that the position of a quantum cannot fluctuate infinitely because the value of fluctuations of the momentum cannot shrink to zero.

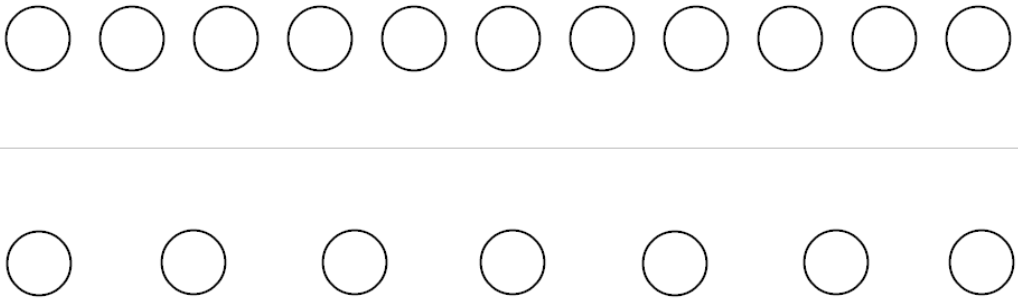
The former concludes that a quantum as a particle can exist in a very broad area. The latter concludes that a quantum as a particle can exist only in a very narrow area. Superball theory suggest that every superball does not move nor exist in a very broad area, while waves of superballs can move and can exist in a very broad area.

Gravity and the Theory of Relativity

Let's extend superball theory. So far, the density of superballs is supposed to be constant. Hence, we will extend superball theory and suppose that the density of superballs is not constant but variable. If we take up such an idea, we will find that we can unify quantum mechanics and the theory of relativity through superball theory. This means that the unification of quantum mechanics and the relative theory is possible.

Density of Superballs

So far we didn't consider the density of superballs. This means that the density of superballs is supposed to be constant. However the density of superballs can have various values. In order to understand this idea, we could see the following figure.



[fig19]

This figure expresses that superballs can bring about different densities. The upper half

means the space of high density, while the lower half means the space of low density. The former is a dense space, while the latter is a thin space. Each of two spaces have a constant density of different values.

Usually we don't need to consider the density of a space if we take only one space of one density. However we need to consider the densities of spaces if we take two or more spaces of different densities.

Semiabsolute stationary

Here I change the stream of story. I leave the topic of the density and pick up another topic, which is the topic.

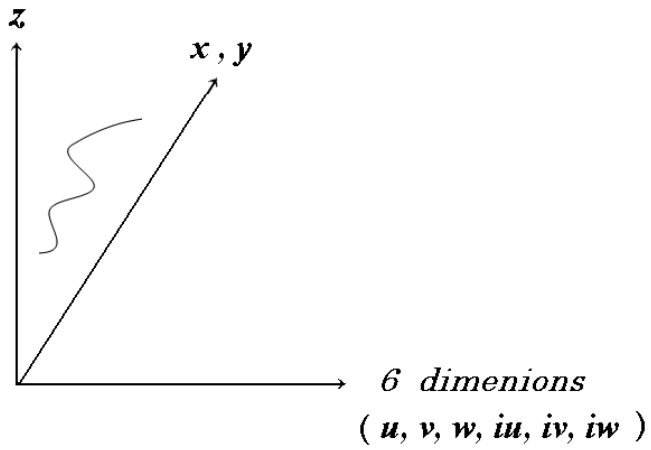
I now propose a new idea, which is named "semiabsolute stationary". This idea could be compared with the idea of "absolute stationary" or "relativity". Physics in 19th century supposed that there was, in vacuum, something as an absolute stationary medium, which should be named "the ether". However the Michelson-Morley experiment proved that there was not such an medium.

This experiment denied only the ether as substance. This ether should have real numbers and exist in the space of 3 macro dimensions. Now we could name it "the real ether". Meanwhile, the ether which is supposed by superball theory should have complex numbers and exist in the space of 6 micro dimensions. We have named it "the complex ether". The real ether is supposed in physics of 19th century, while the complex ether is supposed in superball theory. Both of them are quite different.

The complex ether has 6 micro dimensions, which are different from 3 macro dimensions. Each of these 6 micro dimensions is perpendicular to 3 macro dimensions. This conclusion brings the following conclusion.

"The complex ether seems to be stationary even if an observer moves to any direction in the space of 3 macro dimensions."

You would easily understand this conclusion if you see the following figure.



[fig20]

This figure expresses 3 types of dimensions. Dimension *x,y,z* belong to the macro space. Dimension *z* is expressed as a vertical line. Dimensions *x,y* are expressed as one slant line. 6 dimensions of the complex ether are expressed as one horizontal line.

Even if an observer moves to any direction in the space of *x,y,z*, nothing influences the space of 6 dimensions. Whether an observer moves or stops doesn't influence the waves in the complex ether.

Let's take up a simile. There is the macro space of 3 macro dimensions: *y,z,u*. If a tuning fork moves in the plain of *y-z*, this movement does not influence the sound wave toward *u* direction, so that the sound never brings about Doppler effect.

Thus we can realize that the movement in a direction does not influence a perpendicular direction. As far as we notice the 6 dimensions of the complex ether, a movement in the macro space is as same as nothing. In other words, the complex ether for moving substance and the complex ether for standstill substance is equivalent. This means that the complex ether seems to be standstill for any substance.

The complex ether is as same as standstill for any substance. This idea is named "semiabsolute stationary".

If the real ether exists, it must be absolute stationary, so that it should conflict with some experiments. Meanwhile, the complex ether should not be absolute stationary but just should be semiabsolute stationary, so that it conflicts with no experiments. Then, why can we get the idea of semiabsolute stationary? It's because we have already got the idea of the complex ether which has 6 dimensions perpendicular to the 3 macro dimensions.

*

[Supplementary Note]

Let's remember the Michelson-Morley experiment to compare these two ideas. If the space that transmits light were the real ether, the properties of light as waves would depend on the movement of an observer. If an observer moved in the real ether, the relative

speed of an observer to the real ether should change. However if the space that transmits light is the complex ether, the properties of light as waves doesn't depend on the movement of an observer. The real ether is an absolute stationary substance. The complex ether is a semiabsolute stationary something, which doesn't belong to the macro space.

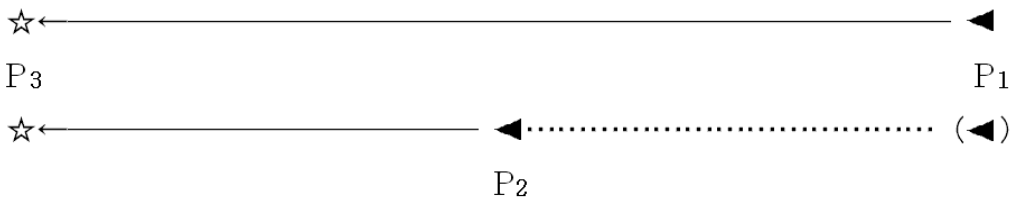
Constancy of Light Velocity

We have got the idea of semiabsolute stationary. This idea should brings the following conclusion.

"Light velocity is constant because light velocity is independent of the movement of an observer."

This is just the principle of the constancy of light velocity, as told in the theory of relativity. If we apply this principle to superball theory, we should get a new idea about the density of superballs. It is as follows.

Let's suppose that there are two persons: one on the earth and the other on a rocket, whose velocity is a half of the light's velocity. Then two persons should discharge a pulse of light forward.

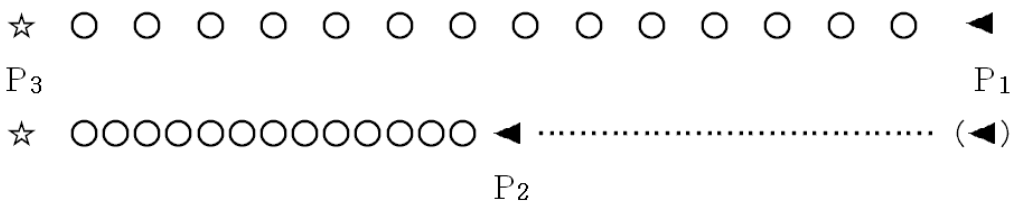


[fig21]

The upper half of the figure expresses the case of the person on the earth. He discharge a pulse of light at the position of P_1 and the light reaches the position of P_3 after a certain time.

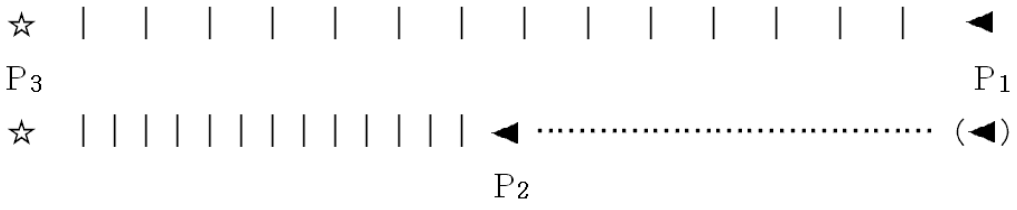
The lower half of the figure expresses the case of the person on a rocket. He discharge a pulse of light at the position of P_1 and the light reaches the position of P_3 after a certain time. So far the explanation is the same as the case above. However, the rocket of the lower half moves from P_1 to P_2 in a certain time.

If you compare these cases, you would find the difference of densities (of superballs). Each of the upper half and the lower half has a space between a person and P_3. Thus, both the space should have different densities. You can understand it if you see the following figure.



[fig22]

This figure expresses that both of the upper half and the lower half have different densities of superballs. If we replace ○ by | , then we get the following figure.



[fig23]

This figure is as same as that of the Doppler effect. (You could regard black triangle as a sound source and regard | as a wave of sound.)

Contraction of Measure

As mentioned above, the density of superballs is not constant but variable. There is a space whose density is dense, while there is a space whose density is thin.

However both of a person in a dense space and a person in a thin space do not find that the density of his space can change. Why so? When the density of a space changes, the density of a measure also changes. If a contracted space is checked by a contracted measure instrument, this measure instrument cannot proves the contraction of the space. That's the reason.

You should pay attention to contraction of measure. Measure contracts in a dense space, while measure expands in a thin space. These are equivalent to Lorenz contraction. Superball theory gives the ground of Lorenz contraction.

Nonsubstantial Cosmos

Let's look back. We have realized that the constancy of light velocity can be explained by the idea of density (of superballs). Indeed, the idea of density gives the idea of Lorenz contraction. However, the idea of Lorenz contraction is not enough to conclude the constancy of light velocity. Superball theory at present lacks something. What's it?

Let's remember the idea of semiabsolute stationary. Is this idea applicable to all the quanta? No. It is applicable to light but is not applicable usual quanta, such as an electron, proton, etc. Why so?

Let's remember the figure of semiabsolute stationary (**[Fig.20]**). The ether appears to be standstill for every observer who is moving or standstill. However, if the ether has 3 macro dimensions, the ether should not appears to be standstill. Therefore, the ether have none of 3 macro dimensions. If the constancy of light velocity is valid, light as waves in the ether must have none of 3 macro dimensions. Reversely, if light as waves in the ether must have none of 3 macro dimensions, the constancy of light velocity should be valid. It is because light is independent of 3 macro dimensions. Thus, we can take up the following proposition.

"Waves in the ether must have none of 3 macro dimensions. Waves in the ether must have only the other 7 dimensions."

This proposition is equivalent to the following proposition.

"A superball must have none of 3 macro dimensions. A superball must have only the other 7 dimensions."

This proposition is equivalent to the following proposition.

"Our cosmos consists of two independent parts. One is the cosmos of 3 macro dimensions, while the other is the cosmos of 6 micro dimensions of the complex ether."

For example, usual substance belongs only to the cosmos of 3 macro dimensions, while light belong only to the cosmos of 6 dimensions of the complex ether. The former has mass, while the latter has no mass. Then, we could name the former "substantial cosmos" and the latter "nonsubstantial cosmos". Usual substance belongs to substantial cosmos, while light belongs to nonsubstantial cosmos.

Light should not belong to substantial cosmos. If light could belong to substantial cosmos, light would not have the constancy of velocity. Therefore, light should not belong to substantial cosmos. That's already explained. Then, what about superballs of the other quanta (except light)? Could they belong to substantial cosmos? Perhaps, no. If a superball of an ordinary quantum such as an electron or proton could belongs to substantial cosmos, this superball has a certain observable size in the substantial cosmos and therefore this superball must be observed. In fact, it is not observed. Therefore superballs of ordinary quantum should not belongs to substantial cosmos. They should belong only to

nonsubstantial cosmos. To sum up, all superballs should belong only to nonsubstantial cosmos.

A particle as a substance belongs to substantial cosmos. However, if a warp occurs, it convert itself to waves. Superballs for these waves rotate in nonsubstantial cosmos. Thus a particle goes out of substantial cosmos into nonsubstantial cosmos.

Meanwhile, light is always waves and exists in the nonsubstantial cosmos. Waves in the nonsubstantial cosmos is independent of the movement of an observer in the substantial cosmos. Waves in the substantial cosmos appears to have the same velocity. Thus the idea about the constancy of light velocity can be explained through the idea of nonsubstantial cosmos.

The idea of the constancy of light velocity and the idea of nonsubstantial cosmos are almost equivalent. Ordinary people feel that the idea of the constancy of light velocity is mysterious and unnatural. Most physicists think little of such a naive feeling. It's not fair. Physicists should respect such a naive feeling. Why so? Is it because ordinary people are right? No. Ordinary people are wrong, however, their mistake is as same as that of most physicists. Both of them have just the same mistake. They are as follows.

"Light velocity should not be constant. Light velocity should depend on the movement of an observer."

"Light should not belong to another cosmos. Light should belong to our substantial cosmos. Light should travel our substantial cosmos. Therefore its velocity should depend on the movement of a substance, though it is not possible."

Both ideas are natural but wrong. Both idea are almost equivalent. The idea of the constancy of light velocity is somewhat unnatural but right. So is the idea of nonsubstantial cosmos.

*

[Supplementary Note]

Light should belong to nonsubstantial cosmos. At the same time, we can observe light by eyes or a measuring instrument in substantial cosmos. Is there a contradiction between them? No.

Superball theory just suggests that the existence of light should belong to nonsubstantial cosmos. (This implies light has no mass.) Meanwhile, force of light could belong to substantial cosmos. (Force can be observed in substantial cosmos.)

Existence and force are different. The existence of light and the force of light are different. The former belongs to nonsubstantial cosmos, while the latter can be observed in substantial cosmos. There is no contradiction.

Gradient of Density

We have got the idea of density of superballs. Then, in some space, density might change gradually. It can be expressed in the following figure.

[fig24]

The density of superballs is dense in the left side, while the density of superballs is thin in the right side. We can understand the meaning of this figure easily. Then, does such a space exist in fact? Yes. It is a gravitational field.

Let's suppose that there is a big mass in the very left side of this figure. This big mass should bring about the gravity. The space is dense where the gravity is strong, while the space is thin where the gravity is weak. In the space between them, a certain force does act for substance. This force is the gravity. Its direction is from a thin space to a dense space.

We can suppose that this force would be produced by the gradient of densities of space. This idea is almost equivalent to that of the general theory of relativity.

*

[Supplementary Note]

The general theory of relativity and superball theory has the same idea for the gravity. However both the theories have two important differences. The general theory of relativity regard the space as an empty space, while superball theory regard the space as the ether. The general theory of relativity regard the space as a Euclid or NonEuclid space of real number dimensions, while superball theory regard the space as the composition of substantial cosmos and nonsubstantial cosmos.

Gravity Lens

Let's take up the gravity lens as a phenomenon of the gradient of density. There are four interpretations about the gravity lens. They are as follows.

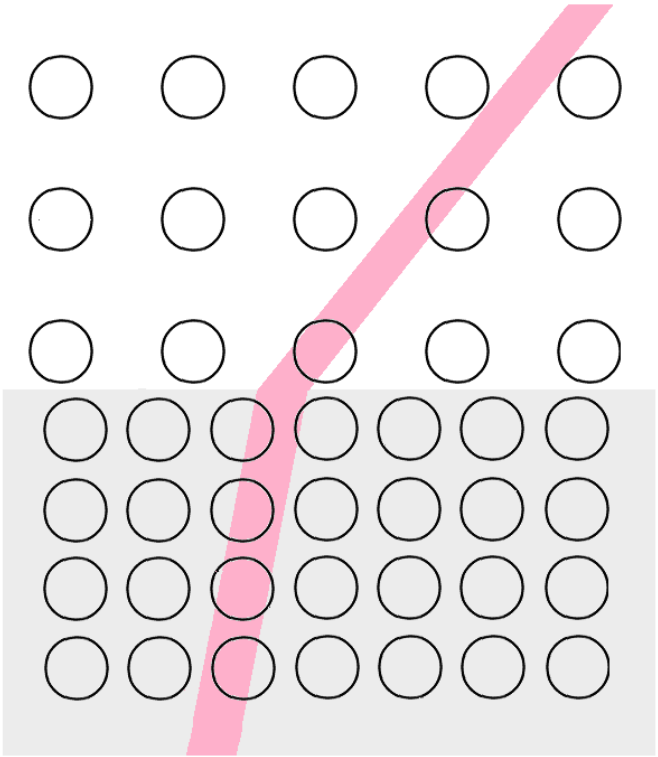
- According to classical mechanics -- "Light goes straight in every space."

- According to the general theory of relativity -- "The space can be distorted by the gravity. If light goes straight in the distorted space, it appears that light goes curving."

- According to a naive idea -- "Light is pulled by the gravity in the gravitational field." (This is unnatural because light has no weight.)

- According to superball theory -- "Light is refracted in the space where the density of superballs changes gradually."

What is the refraction in superball theory? It would be obvious if we see the following figure.



[fig25]

The refraction in superball theory is as same as the refraction in optics. Light is refracted at the boundary of air and water when light goes from thin air to dense water. Air and water have different indexes of refraction and therefore there occurs a refraction at the boundary.

Air and water have different constant indexes of refraction, usually. However, if they have inconstant indexes that change gradually, the path doesn't angle at a boundary point but curves smoothly and gradually. This means the gravity lens, of course.

Summary

To sum up, we might suggest the following.

"The theory of relativity can be explained within the range of superball theory, if we get the idea of variable density of superballs."

To speak simply, the theory of relativity is a part of superball theory. Of course, the theory of relativity is very important because it gives numerical formulas. Meanwhile, if we would build a numerical formulas based on the ideas of superball theory, these numerical formulas would be completely the same as those which are given by the theory of relativity.

Both of the theory of relativity and superball theory tell just the same contents with different words. The theory of relativity uses the words of classical mechanics, which describe the world of macro size. Superball theory uses the words of superball theory, which describe the world of micro size. That's the main difference.

Gravity and Forces

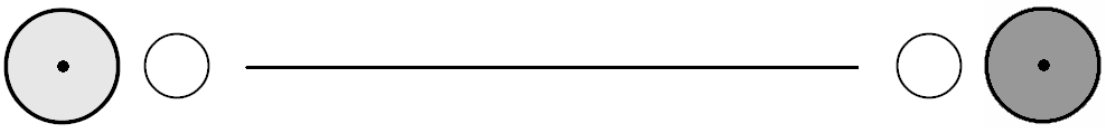
Let's take up the problems of gravity. To tell the conclusion first, superball theory can reveal the essence of gravity. We should not regard gravity as a force that has the form of waves but as a force irrelevant to waves.

What is a Force?

Let's take up a new question before we take up the problem of gravity. It is this question: "What is a force?"

Of course, physics of today gives us an answer as follows.

"Forces are something that are caused by the exchange of particles."



[fig26]

Suppose that there are two big particles and , which don't have to be of the same kind. Then a force is mediated between them. This force could be mediated by small particles

For example, electromagnetic forces are caused by the exchange of photons, while nuclear binding forces are caused by the exchange of mesons. In the figure above, small particles means the photons or mesons.

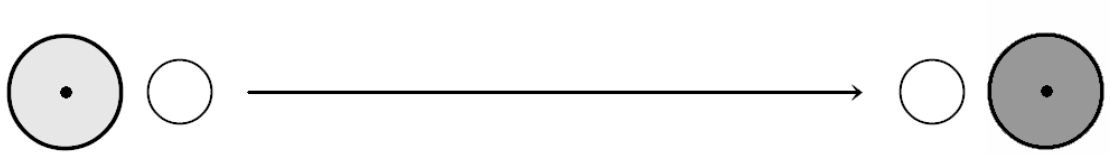
Exchange of Particles

Then we should have a new question: "What is the exchange of particles?"

There are two interpretations as follows.

(1) Current Physics

Current Physics suggests an interpretation of the exchange of particles



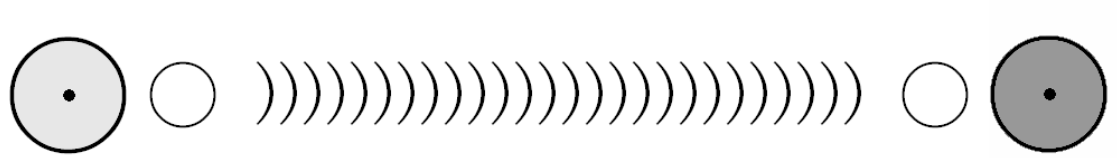
[fig27]

A particle moves from the left to the right. This particle moves on the direction " → ". Thus the movement of a particle occurs. If there are a couple of movements of both directions " → " and " ← ", this phenomenon is the exchange of particles. Thus a force occurs.

However this idea is somewhat unnatural to be accepted intuitively. We can easily imagine the exchange of photons like throwing and catching of a sports ball, but we cannot easily accept that this phenomenon should brings about a force.

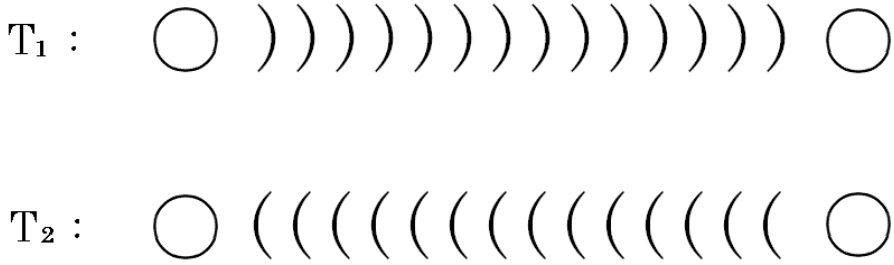
(2) Superball Theory

Superball theory suggests another interpretation of the exchange of particles. First of all, superball theory suggest the interpretation of the movement of a particle. It is a warp.



[fig28]

The processes above means a warp of one direction. Of course, there can be another warp of the opposite direction.



[fig29]

This figure expresses two directions. If there are a couple of warps of two directions in fact, this couple warps means the exchange of particles. To sum up, what we call the exchange of particles is a couple of warps of both directions in essence. What we regard as the exchange of particles is merely an outward appearance of a couple of warps.(or many couples of warps.)

According to the idea of current physics, the exchange of particles means the movements in both directions, which are similar to the movements of a thrown sports ball in both directions. According to the idea of superball theory, the exchange of particles doesn't mean the movements in both directions but does mean the warps of both directions.

The former suggest a couple of movements of particles, which would need kinetic energy. The latter suggest a couple of transmissions of waves, which don't need kinetic energy. The former is unnatural and the latter is natural.

For example, let's pick up a very heavy particle such as the W particle or the Z particle. If we take up the former idea, this heavy particle must exist and would needs kinetic energy for the movement. (: were it not for the idea of virtual particles.) However, if we take up the latter idea, this heavy particle doesn't have to exist as a substance and needs no kinetic energy for the movement. Superball theory suggests that only the transmissions of waves of particles is necessary and the movement of particles is not necessary.

Thus we should take up the latter rather than the former. Of course, we can intuitively accept the latter: force as a couple of warps.

Force and Waves

We have read two interpretations above. Both the interpretations are not the same but seems to be equivalent if we see only the outward appearances of them.

Why so? The relation of a force and particles can be expressed in the following schema.

[Current Phiscs]

Exchange of Particles ⟶ Force

[Superball Theory]

Transmission of *Waves of Superballs* ⟨ Force / Exchange of Particles

[fig30]

This schema means the followings.

- According to current physics, the exchange of particles gives a force.
- According to superball theory, the transmission of waves gives both of a force and the exchange of particles.

Superball theory suggests that each interpretation gives the same outward appearance. If we see just outward appearances, we cannot decide which interpretation is true. How can we decide it? It's the problem of the relation between theories and experiments. This problem should not be referred here. However, if we would take up the latter interpretation, we could get fruitful conclusions. These fruitful conclusions are to be explained later.

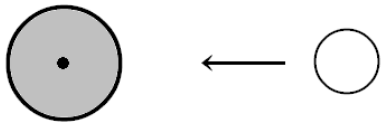
Gravity as a Force

Now, let's take up the problem of the gravity.

The gravity is a force. However, is it a force as same as other forces, such as electromagnetic force? Most physicists of today believes an affirmative answer, while superball theory suggests a negative answer. Why so? The reasons are too complicated to be explained briefly. Therefore I will explain them later. Instead, I now tell a rough conclusion as the following.

"The gravity is not a force caused by the exchange of particles but a force caused by the collision of superballs."

This suggestion can be expressed by the following figure.



[fig31]

There are a big particle  at the left position and a small superball  at the right position . The big is a particle of substance and the small is a superball. When the small collides against the big, this collision causes a certain force. It is the gravity.

When we take up such an idea with the figure above, we should pay attention to the followings.

- The small superball moves only in one direction. (Meanwhile, in the case of the exchange of particles, particles move in both directions.)

- The small superballs doesn't vibrate at a position but moves. (Meanwhile, in the case of the transmission of waves, superballs don't move but just vibrate at a position.)

  These are features of collision. They are different from the features of the exchange of particles or those of warps in both directions.

Gravity and the General Theory of Relativity

Superball theory suggest that the gravity is not caused by the warps of particles in both directions but is caused by the collision of superballs in one direction. If we take up and

formalize this idea, we could get some numerical formulas.

What formulas? Actually, they are the same as those of the general theory of relativity. In other word, as far as we consider the gravity, superball theory and the general theory of relativity are the same in essence.

As mentioned before, superball theory supposes the density of superballs and also supposes the gradient of density. Superball theory suggests that there is a space where the density changes from a high value to a low value gradually such as the following figure.

[fig32]

This figure express a space where the density changes gradually. The left side has a high density while the right side has a low density. Such a space of gradual density of superballs is regarded as a gravitational field.

When you look at this figure, you should suppose that there is a big mass in the very left side. The density is dense in the left side where the gravity is strong while the density of superballs is thin in the right side where the gravity is weak.

A force does act on substance with the direction from the right to the left: in other words, from the space of low density to the space of high density. Such a force is the gravity. This force comes from the gradient of densities. -- This idea is equivalent to that of the general theory of relativity.

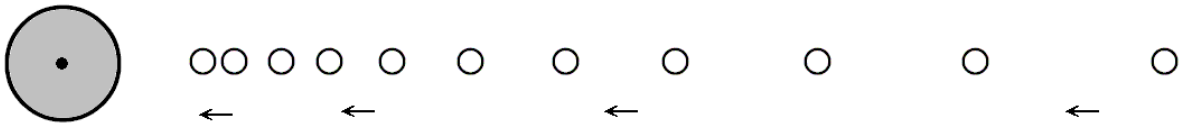
The mentioned above is as same as the mentioned before. Then we have the following question.

"Why does the force of the gravity act on substance in the space if the space has the gradient of density? Why does the force occur without waves?"

Of course, superballs theory suggests that the gravity comes from the collision of superballs. This is the conclusion. The reason will be explained in the next section.

Gravity Model

In order to explain the gravity, superball theory uses a model whose name is "gravity model". This model is expressed as the following figure.



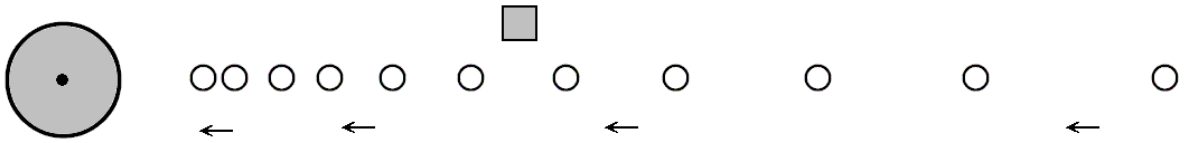
[fig33]

There is a big particle  in the left. Each small superball  moves toward the left. This figure means that each superball doesn't stand still but moves in one direction.

Gravitational Force

Gravity model, which we introduced in the last section, gives an answer to the question "what is the gravity?" The answer is as follows.

"The gravity is the force given by the collision of superballs to a substance."

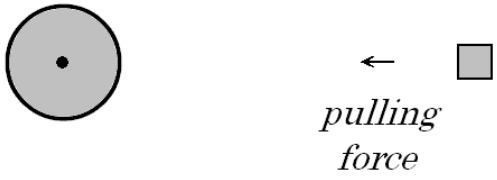


[fig34]

This figure expresses that there are moving superballs and a standstill box of substance. Against this box collide superballs one after another in one direction. These collision gives the box a force in the same direction. This force is the gravity.

This figure gives a remarkable meaning. The gravity is not the pulling force of something that exists in the left, but is the pushing force of superballs that exists in the right. The box is not pulled to the left by something, but is pushed from the right by superballs. Superballs in the right collide against the box one after another to push it.

For example, when there is the gravity between the Sun and the Earth, the Earth is not pulled by the Sun, but is pushed by the force of the space on the opposite side. Superball theory suggests so.



[fig35]

(the Model of Universal Gravitation)

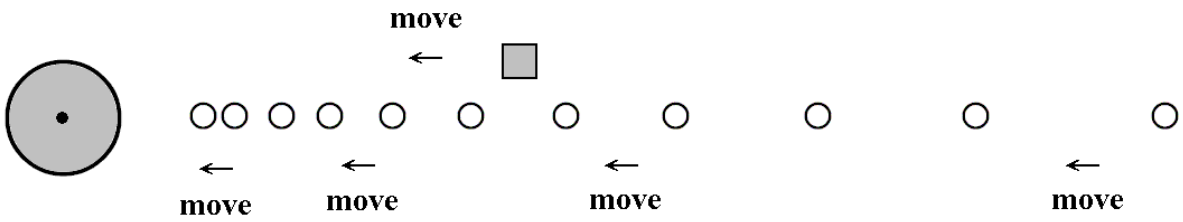
[fig36]

(the Model of Superball Theory)

If the gravity were a force between two substances to make them pull each other, there would be waves of superballs between them. However, if the gravity is a force from the outside of them, there should be no waves of superballs between them. If we have the idea of the collision of superballs, we could abandon the idea of gravitational waves, perhaps.

Gravity Model and the General Theory of Relativity

Let's investigate the gravity more precisely with the use of gravity model. If a box stands still in a gravitational field, it gets a pushing force. However, if a box is left free in a gravitational field, it gets no pushing force. This means that a free-falling object in a gravitational field feels no force.



[fig37]

A man, who is expressed as a box , cannot distinguish whether he is left free to accelerate in a gravitational field or he stands still in the non-gravitational field. (**[Fig.39]**) On the contrary, a man cannot distinguish whether he stands still in a gravitational field or he accelerate in the non-gravitational field. (**[Fig.36]**) To sum up, gravity model is equivalent to the general theory of relativity in essence.

Conclusions about Gravity

We have investigated the gravity a lot so far, and now can suggest the following

conclusions.

"The gravity is a force which influences mass in the space of 3 macro dimensions."

"We can understand the gravity enough if we regard the gravity as a force which is caused by the collision of superballs."

"Gravity model and the general theory of relativity is equivalent in essence. The numerical formulas of gravity model should be the same as those of the general theory of relativity. When we calculate the gravity, we don't have to modify the current formulas nor get a new numerical formula as an expansion."

"We should just pay attention to the applicable ranges. Einstein's formulas are based on classical mechanics, so that its applicable ranges is from zero to infinity. Meanwhile, the applicable range of gravity model has the lower limit of $2r$ as the diameter of a superball."

"Gravity model expresses the lower limit of applicable range by itself. In a very small area, the ether loses the smoothness and gains lumpiness, because the ether is not an empty space but a space full of superballs."

"Each numerical formulas of physics has a certain applicable range and is somewhat inaccurate outside of its applicable range. However superball theory itself is not inaccurate as a model or an idea. The idea of superball theory correspond to no numerical formula that is fixed and therefore it can escape or get over the limit of numerical formulas."

Appendix

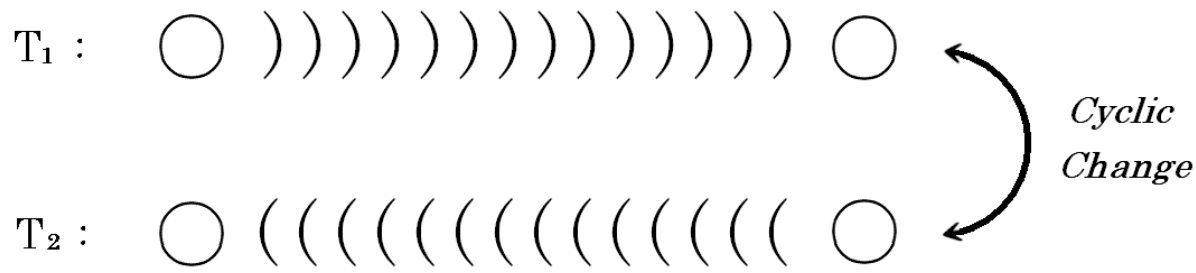
The main part of superball theory has already been explained. The remains are only supplementary parts. Hence I will tell some guesses. They are just guesses or, so to speak, hypotheses for hypotheses. It is not easy to verify whether they are right or not. However, we need such guesses in order to investigate the core of the truth, especially the core of the truth of forces.

Resonance

What is a force? We have already got an answer as followings.

"Forces are something that are caused by the exchange of particles. However, what we regard as the exchange of particles is merely an outward appearance of a couple of warps."

The latter half was expressed by **[Fig.29]** before. Now I shall take up it again after a little modification.



[fig38] This figure means the following two propositions.

"There is a couple of warps of both directions."

"Each warp changes cyclically." (It's the cyclic change.)

We have suggested that there should be a couple of warps of both directions. However it's not enough. A couple of warps of both directions should continue again and again as time goes on. This means that many couples of warps should continue and each warp should change cyclically. Thus we could guess there would be the cyclic change of warps.

The idea of the cyclic change is important. Then, what is the cyclic change? What does it mean in essence? This is a difficult problem. First of all, we should take up a similar phenomenon. It is resonance (of sounds).

Let's suppose a usual phenomenon of resonance. A couple of tuning forks of the same frequency can resonate each other. If we realize it, we could suppose that a couple of superballs of the same frequency should resonate each other. Both phenomena would perhaps have something common.

Let's use a literal simile. A couple of lovers who belong to the same type would resonate each other. When they resonate, they feel a pulling force between them. This force is love. Thus, resonance causes a pulling force.

Two explanations above are similes. When we understand these similes and find there is something common in them, we could also name the similar phenomenon of superballs "resonance". Resonance in superball theory means the cyclic change of warps.

Now we have got some similes, so that we can somewhat understand what a force is. However, it's not enough. We should understand much more. Firstly we have already understood intuitively, and secondly we should understand scientifically.

Soliton and Stationary Wave

Let's inquire into the essence of resonance.

What is resonance in superball theory? It should be the state of cyclic changes. Of course,

cyclic changes means the alternately changing of warps.

In usual cases, each warp occurs individually. For example, a warp occurs here and another warp occurs there while both the warps have no relation. However, in the cases of resonance, each of a couple of warps has a certain relation. Let's take a simile. In usual cases, each man and woman acts individually. However, in the cases of married husband and wife, each of them has a certain relation. Then, what is the difference between both types of cases?

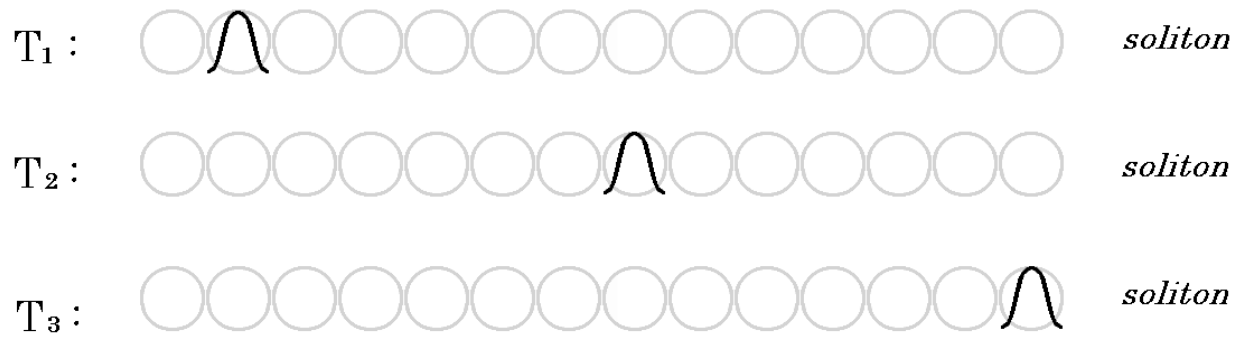
We should pay attention to that resonance brings about not only the both direction of warps but also the both direction of waves. Then we could get a new interpretation as follows.

"A warp has a wave, which is a soliton. Resonance has waves, which are stationary waves."

This interpretation uses the idea of a soliton. A soliton, which means a solute wave, is expressed by the following figure. (This figure means that a soliton moves in the way from the left to the right when time goes on as "$T_1 \rightarrow T_2 \rightarrow T_3$".)

[fig39]

This figure resembles the **[Fig.07]**, which is the figure for wave theory. Both figures are similar but have a difference. Wave theory suggest that a quantum is a wave or waves. Superball theory suggests that a quantum is a soliton, while a soliton is a wave that is transmitted on superballs. Superball theory concludes that superballs as the ether don't move but a soliton moves. Wave theory suggest that a quantum moves. Superball theory suggest that a quantum doesn't move but does warp.

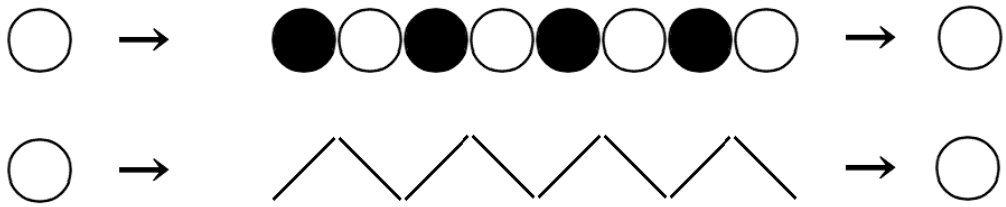


[fig40] This figure expresses that a soliton moves while every superball keeps its position. We can understand it. Now, there comes a new question.

"Why does a warp occur by a soliton?"

We take up this question and should consider the meaning of a soliton. A soliton is a wave, which has some vibration. This vibration means the rotation of superballs. When a superball rotates, its phase changes between top and bottom. When the phase is top, the superball comes to be a particle. When the phase is bottom, the superball comes to be an antiparticle.

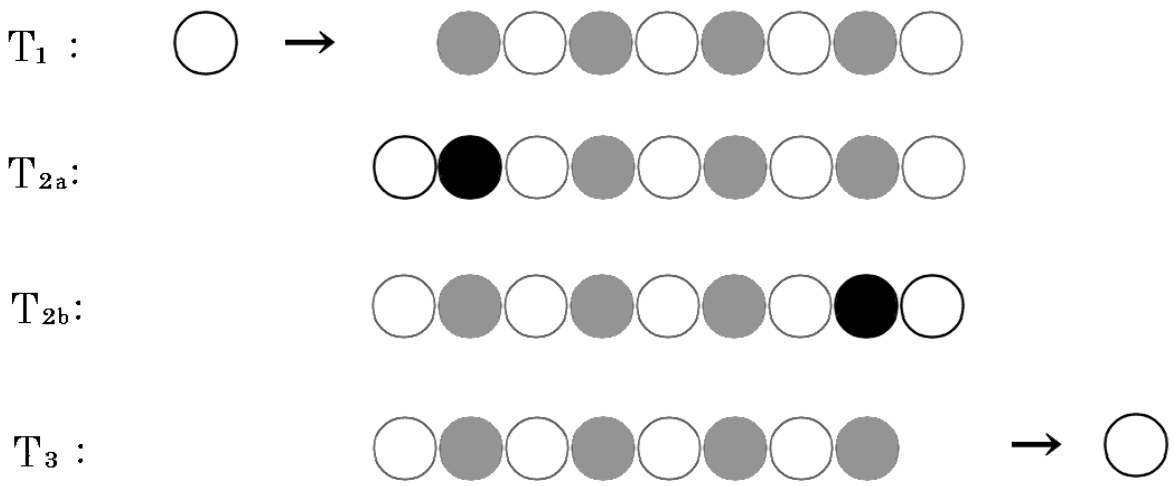
We can take up only top and bottom so that we should express the process of a warp by a simplified figure.



[fig41]

This simplified figure has the upper half and the lower half. In the upper half, a particle is expressed by a white ball and an antiparticle by a black ball. If we rewrite a white ball to " \ " and a blackball to " / ", we can get the lower half. The lower half shows a zigzag line, which resemble a sine curve.

When a soliton moves, phases of superballs changes one by one (from the left to right). At last, the soliton reaches the end point and produce a particle. Thus a soliton travels the space and produce a particle at the end point. Whole this process is a warp. This process is expressed by the following figure.



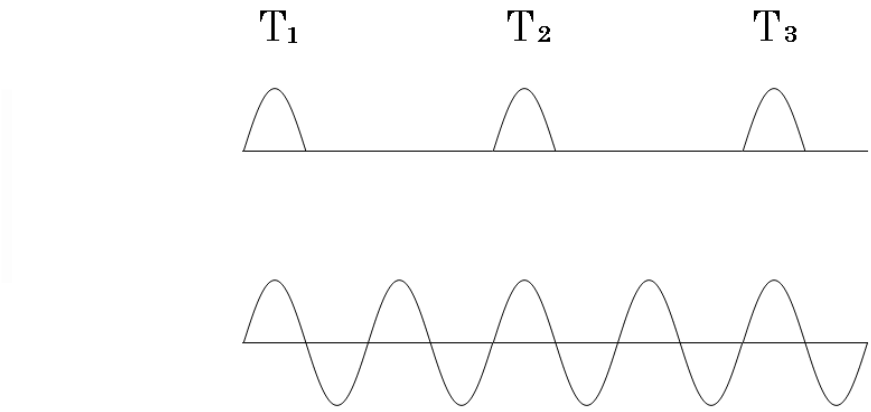
[fig42]

Thus a warp occurs by a soliton. We used the idea of a soliton and understood what the warp is. Then, we should investigate furthermore.

So far we have supposed that a wave exists in just one position at the same time. This is the most simple case. Now we can suppose another case as follows.

"Many waves always exist in all positions between the starting point and the end point at the same time."

Such waves are known as stationary waves. A soliton and stationary waves are expressed by the following figure.



[fig43]

The difference of a soliton and stationary waves can be explained as follows.

A soliton moves from the left to the right as time goes "$T_1 \rightarrow T_2 \rightarrow T_3$". What we call a soliton is not the same one in a strict sense. A soliton of one time and a soliton of another time are regarded as the same wave but are different phases of different superballs.

Stationary waves don't move even if time goes on. Stationary waves as a whole look to be

always the same. Of course, each part of stationary waves is not the same, but the outward appearance of the whole looks to be the same. This is a stable state. This is a steady state. It would correspond to resonance. Then we can guess as follows.

"Resonance has waves, which are stationary waves."

Resonance, which means cyclic change of warps in both directions, should have stationary waves. As you know, stationary waves can have both directions at the same time. Stationary waves can be regarded as the composition of waves of both directions.

After all, we can conclude as follows.

"Resonance is a state of waves, especially stationary waves. Waves mean solitons on superballs."

"Resonance is equivalent to many couples of warps in both directions."

"Resonance as many couples of warps looks like the exchange of particles because each warp itself looks like the movement of a particle."

*

[Supplementary Note]

The explanation above is just a guess. We get this conclusion not by necessity but by some convenience. If we get this conclusion, we can get many conveniences. For example, the conception of a soliton shows us its similarity to quantum field theory or solid state physics, so that we can understand all of them in a common idea.

Now we might have to modify the idea of "waves". If we get the idea of a soliton, a warp should have not plural waves but just a single wave (a soliton). We might have to modify the number of waves from plural to single and rewrite the word "waves" to "a wave". However, its not the problem of physics but just the problem of English grammar. That's not a serious matter. If we get the interpretation that the plural connotes the single, there would be no problem. Therefore I don't intend to rewrite them, at present.

Respiration

We have already got a new interpretation as follows.

"Resonance is a state of waves, especially stationary waves. Waves mean solitons on superballs."

Then, what is a force? Is resonance itself a force? Are stationary waves themselves a force? Perhaps, no.

Let's suppose the case of the force between a proton and a neutron. This force doesn't act directly between both particles but is mediated by mesons. Waves for this force are the waves of mesons. There would be resonance, especially the resonance of mesons. When

there is a force between a proton and a neutron, there would be no resonance between proton and a neutron but there would be the resonance of mesons. This is important.

If we use **[Fig.28]**, resonance is not a state between two big particles of substance but is a state between a couple of small superballs. Moreover, resonance is not a steady state of waves of substance but is that of superballs.

Resonance is just a steady state of superballs. Then, what about two particles of substance? What relation do they have? Of course, they would have a certain relation through mesons. Mesons should be medium. What we call the relation of a proton and a neutron would not consist of one part. It should consist of three parts: the relation between a proton and a meson, that of many mesons, that between a meson and neutron.

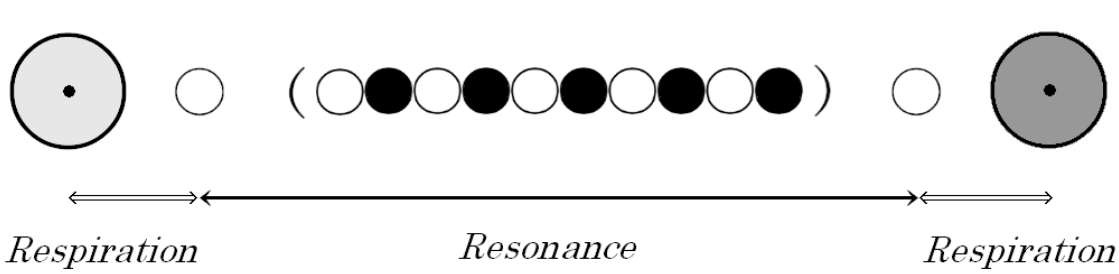
proton -- meson -------- meson -- neutron

Resonance is the relation of mesons. Then, what are the others? What is the relation of a proton and a meson? What is the relation of a meson and neutron?

Let's remember a famous idea. It is the idea of a cloud of photons, as you know. An electron has, around it, many photons like a cloud. They are so-called a cloud of photons. Then, where a cloud of photons come from? Of course, from the electron in the center.

An electron always absorbs and emits photons. An electron always breathe photons in and out like a person always breathe air in and out. This is a well-known phenomenon. Let's name this phenomenon "respiration".

Now we have two ideas: "resonance" and "respiration". Let's sum up them and express them in a figure as the following.



[fig44]

There are relations of two type. One is respiration, which is the relation between a big particle and a small superball. The other is resonance, which is the relation between many small superballs.

We have already got a guess that the exchange of particles should be resonance. This guess is not enough. We should get more guesses.

Firstly, guesses about resonance as follows.

"Resonance is just a steady state, which means only a stable state."

"Resonance is something like a rope, which transmits a force."

"There are differences between a force itself and the transmission of a force. Resonance is not a force itself. Resonance does act only for transmission of a force."

"The value of a force is the same as the value of resonance. The value of a force cannot be easily measurable but the value of resonance is easily measurable because resonance is a stable state."

"Even if two value of two phenomena are the same, it doesn't mean that both the phenomena themselves are the same. However, we are apt to regard two phenomena as the same one if they have the same value. This confusion brings a misunderstanding."

Let's explain the last guess. Suppose a rope, for example. The value of a force that transmits in a rope can be measured by the tension of the rope. However, this force is not caused by the rope but is caused by outer men who pull the rope from the both sides. It is just a simile. Suppose resonance, again.

The value of a force between two big particles can be measured by the value of resonance, however, this measured force is not the force of respiration but is the force of resonance. Resonance and respiration have the same value of force, but both are not the same phenomenon. Respiration is not resonance nor the exchange of particles. This force is caused by respiration but is measured through resonance. We should not confuse both phenomena.

Secondly, guesses about respiration as follows.

"It is respiration that causes a force."

"Respiration is the relation between particles of different types. For example, the relation between an electron and a photon. An electron is substance."

"A force is usually observable because it is a force between two substances. However, two substances don't have direct relation but have just indirect relation, in which a force is mediated by the ether."

The last guess is important. Current physics suggests that a force between two substances are caused by the exchange of particles. This idea needs only substances in empty space. However, the last guess of superball theory needs the ether.

Then, what does the ether act for a force?

Ethereal Vibration

Let's inquire into the idea of respiration. Respiration brings about waves. Waves should be transmitted in the ether. Then, how do waves act for a force? How waves bring a force?

Let's remember some ideas of current physics. We have got, as you know, the idea of the "field" such as the electromagnetic field. This idea is important. Then, what does this idea mean in superball theory?

When respiration causes a force, this force would be mediated by waves which are transmitted in whole space. This transmission in whole space would mean the vibration of the ether. Now we get a new idea of "the vibration of the ether". We could name it "ethereal vibration".

Of course, ethereal vibration means the vibration of the ether or the rotation of superballs. If respiration occurs, then the ether should vibrate or superballs should rotate. This state of space means the field. We can regard the field as the state of ethereal vibration. Ethereal vibration in the ether and the field in space are almost equivalent.

For example, an electron breathe photons in and out, so that this respiration causes a force. This force is mediated by waves which are transmitted in whole space of the ether to make ethereal vibration. This state of the space is the electromagnetic field. This field is equivalent to ethereal vibration of a certain frequency.

The idea of ethereal vibration is an extension of that of resonance. Ethereal vibration is the state of waves in whole space, while resonance is the state of waves only in the narrow space between two substances. However, if we get the idea of ethereal vibration before we get that of resonance, we can regard resonance as a specific case of ethereal vibration.

Ethereal vibration can occurs even if there is only one substance. Ethereal vibration needs only one substance at least. However, there can be two substances. If there is two substances, one substance makes its field and puts the other substance in this field. Of course, the latter makes its field and puts the former in this field, too. Thus there should be the field as a composition of two fields. Moreover, both the waves by both the substance would overlap to make interference. This interference would be equivalent to the stationary waves, which mean resonance.

Now we have got a new interpretation. This interpretation gives some guesses as follows.

"The ether can have the state of ethereal vibration, which comes from the respiration of a substance."

"If there are two substances, they create the composition of ethereal vibration to make interference. This interference as a stable state means the stationary waves or resonance. Resonance is a state between two substances in the ether. Resonance looks like the exchange of particles."

"A force is not a direct interaction between two substances but is an indirect interaction between two substances via a medium. This medium is the ether. For example, when there is a force between a proton and a neutron, there is not an attractive force as a direct interaction between them but there is an indirect interaction. This indirect interaction consists of three interactions. One interaction is that between the proton and mesons. It's respiration. Another interaction is that between mesons. It's ethereal vibration, The other

interaction is that between mesons and neutron. It's another respiration, which gives a force. A force is just an interaction between the ether and a substance."

"If there is only one substance, we can recognize it as it is (i.e. without the interference). If there are two substances, we should recognize it with the interference of two fields."

"This interference of two fields means resonance, which is equivalent to the exchange of particles. Namely, a force as the interaction which is caused by the field and a force as the interaction which is caused by the exchange of particles are equivalent. The only difference is that the former needs at least one substance while the latter needs surely two substances. For example, there can be an electromagnetic field without substance after the source of the field has vanished. If there comes an electron, there is only one substance which gets a force."

"There can be one substance. There can be two substances. The latter is a special case of the former. The former is the principle and the latter is just an application. To sum up, a force comes from one principle though it seems to come from two principles. The idea of *field* and the idea of *the exchange of particles* has, in essence, the same principle. This principle is ethereal vibration."

"It is usually no easy to measure a force against a particle independently. However, if there is two particles, it is easy to measure the force between them. This measurability comes from a stable state as resonance. Scientists can just measure this value, so that they believe a force is equivalent to resonance (or the exchange of particles). This belief is somewhat illusion. In fact, a force is not equivalent to resonance, while the value of the force is equivalent to the value of resonance. What are equivalent are not themselves but their values. A force and the exchange of particles are not the same phenomenon but just have the same value."

"For example, if there is only one particle in the field, there is no resonance nor the exchange of particles but there is a force. If there is only one electron in the electromagnetic field, there is no resonance but the electromagnetic field gives an electromagnetic force to the electron. Thus, a phenomenon itself and its value are not the same. The same value doesn't mean the same phenomenon. We should not confuse them."

"If we want to escape this confusion and understand the essence of the field or the exchange of particles, we should take up the idea of ethereal vibration. A force comes from the field, not from particles."

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[Supplementary Note]

The last guess might need some explanations.

A force needs a field, while a field needs particles as a source. Does this mean that a force need particles? No. There can be time gap.

If a particle produce a field and disappear after a moment, there could be only a field and

no particle. That's enough. If there is only a field and no particle, there can be a force though there cannot be the exchange of small particles.

We don't need the idea of the exchange of particles, or rather, we should not use this idea. For example, if we consider a particle which is surrounded by very faraway particles in the cosmos, we had better forget the idea of the exchange of the particles. It is because this particle can exchange no small particles with faraway particles, which vanished long ago and left nothing except a field.

Ethereal Vibration and Warp

Let's compare ethereal vibration with warp. To begin with, we should pick up some features.

Firstly, features of warp are as follows.

- Warp corresponds to the movement of a quantum. What we regard as the movement of a quantum is a warp.
- In the process of a warp, a quantum should have following three stages.
- 1. Disappearance of a particle. (A particle converts itself to waves at one position.)
- 2. Transmission of waves. (Waves travels broad area in the space.)
- 3. Reappearance of a particle. (Another particle appears at another position.)
- Waves mean a soliton.(What we called waves is just a specific wave.)
- A warp is one phenomenon at one time. (It isn't a continuous phenomenon.)

Secondly, features of ethereal vibration are as follows.

- Ethereal vibration corresponds to the field. What we regard as the exchange of particles is almost equivalent to resonance, which is a stable state of ethereal vibration.
- In the process of transmission of a force, a quantum should have following three stages.
- 1. Respiration. (A quantum breathe small particles in and out.)
- 2. Ethereal vibration. (Waves of small particles travels broad area in the space.)
- 3. Force. (Ethereal vibration does act on another quantum.)
- Ethereal vibration means the state of waves. In some cases, it means resonance.
- Ethereal vibration or resonance is a continuous phenomenon (It isn't one phenomenon at one time.)

If we pick up these features and get a comparison, we could take the following suggestion.

"Warp is somewhat similar to ethereal vibration."

This similarity is very important. It hints they have something common. Then, we should inquire into their essence thorough this similarity. Now, let's pick up three couples correspondent stages from a couple of three stages above, and then we could get the following correspondence.

- 1st. Disappearance -- Respiration
- 2nd. Transmission -- Ethereal vibration.
- 3rd. Reappearance -- Force

We should pay attention to the 3rd. Force corresponds to reappearance. Moreover, reappearance is the reversal of disappearance.

Therefore, force should be the reversal of respiration. Respiration and force should be a pair of symmetrical phenomena like disappearance and reappearance are a pair of symmetrical phenomena. This correspondence brings some guesses.

Let's compare a warp with ethereal vibration. If a warp occurs, waves reaches the end point and convert themselves to a particle. If ethereal vibration occurs, waves reaches the end point and give a force to a big particle. In the former case, waves give an existence of a particle. In the latter case, waves give a force to a big particle. Thus, the difference of existence and force comes from that of a warp and ethereal vibration.

Moreover, this symmetry brings the following guess.

"A force is an influence of the ether on substance."

The ether, which means the space full of rotating superballs, always vibrate a little or somewhat. This vibration acts on substance to give some influence. This influence is a force.

Force and Warp

We have realized a similarity: the similarity of warp and ethereal vibration. Now we can view both of them from the standpoint of a certain unification. Force and warp have something common.

A force is given by the waves in the ether, while a warp is given by the waves in the ether. Both is given by the waves in the ether.

This similarity clearly appears in a experiment -- the famous experiment of H.R. Hertz. This experiment means the following.

"If a spark occurs in the gap between two brass balls, afterwards another spark occurs in the wire gap which is placed in a distance."

This experiment proved, as you know, the electromagnetism which had been suggested by

Maxwell. This experiment taught us the electromagnetic force comes from the electromagnetic fields. Moreover, we can now find that it also proves the similarity of force and warp. See this experiment. A spark disappears at the starting point and afterwards another spark appears at the end point. This phenomenon could be regarded as "warp of a spark", which is similar to "warp of a particle".

Force and warp are similar but have some differences. Let's take up now just one difference. Their 2nd stages of three stages are almost the same but the other two stages (1st and 3rd) are different. Then, what is the essence of this difference? It is the difference of the kinds (of particles).

In the phenomenon of a warp, there must exist quanta of one kind. Both of the disappearing particle and the reappearing particle belong to one kind. Moreover, superballs as a medium belong to the same kind, too. For example, in the warp of an electron, all the particles of three stages are electrons. Quanta are the same.

In the phenomenon of ethereal vibration, there must exist quanta of two kinds. A particle for respiration and another particle for force may belong to one kind. However, superballs as a medium must belong to another kind. For example, in the case of ethereal vibration of photons, particles of the 2nd stage are photons, which must be different from electrons. Photons and electrons are quanta of different kinds. This difference gives a force to a particle. Waves bring about a warp if quanta belong to the same kind, while waves bring about a force if quanta belong to different kinds.

Let's take up another difference. It's the difference of collision and respiration. A warp is caused by a collision of a particle, while ethereal vibration is caused by respiration. This symmetry hints the similarity of collision and respiration. Moreover, collision and vibration have some relation because usual collision causes vibration. Meanwhile, respiration can be regarded as something like vibration. Indeed, respiration should be regarded as a sort of vibration because breathing in and out is a sort of vibration, which has two direction of up and down.

Respiration would mean the vibration which is caused by superballs of different kinds. For example, when an electron vibrates, this vibration can be slightly conveyed to the superballs of photons. This conveyance brings about an important effect. In usual cases, the vibration of an electron cannot be transmitted in the ether, while the vibration of photons can be transmitted in the ether.

Why so? It is because, in usual cases, the energy of an electron is too little to bring about a warp. To the contrary, in the case of double-slit experiments, the energy of an electron is large enough to bring about a warp.

The essential difference of warp and ethereal vibration is the size of energy. If the energy of an electron is large enough, an electron can convert itself to waves and does warp. If the energy of an electron is not large enough, an electron remains as it is and just slightly conveys its vibration to the surrounding photons. This phenomenon as the conveyance of

vibration looks like breathing photons in and out. That's respiration.

Respiration occurs only when the energy is not large enough. If the energy is large enough, this energy bring about a warp, so that an electron converts itself to waves. This means that a large energy changes the whole existence of an electron.

Suppose the value of the existence as 1 or 0. Of course, 1 means existence and 0 means nonexistence. If the energy is large enough, the value of the existence can changes from 1 to 0. If the energy is not large enough, the value of existence cannot change from 1 to 0 but can change a little around 1. This little changing means the vibration of an electron. This little changing cannot overturn the whole value of existence of an electron but can overturn the whole value of existence of an photon. The former has a big energy unit, while the latter has a small energy unit. Then, if the whole value of existence of an photon is overturned, a photon can disappear to do warp.

In the phenomenon of respiration, the value of existence of an electron changes a little around 1, while that of a photon changes from 1 to 0 or 0 to 1. An electron equips a big unitary energy, while a photon equips a small unitary energy. Each of both value is so-called the mass (of a quantum). If an electron gets a energy more than the unitary energy, it can change the value of existence, so that it can convert itself to waves. If an electron gets a energy less than the unitary energy, it cannot change the value of its existence but can change the value of photon's existence, so that this respiration brings about ethereal vibration. Of course, ethereal vibration of photons is equivalent to a field: the electromagnetic field.

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[Supplementary Note]

As you know, electromagnetic waves are transverse waves. Then, what about waves of warp? They might be longitudinal waves, because they should occur after the collision of superballs. It's just a guess and has no good reason, however, it is very convincing. The essential difference between ethereal vibration and warp might be that between transverse waves and longitudinal waves. This idea will be taken up again a little later.

Electromagnetic Waves

We have already got ideas almost enough. Now, let's apply them for electromagnetism. Our aim is the following.

"Firstly we should get the ideas of superballs as the foundation. Secondly we should formalize these ideas so that we could get numerical formulas that we could construct the system of electromagnetism."

This can be expressed by the following schema.

ideas (as foundation) → numerical formulas

How should we do it? No matter. That has already been done by Maxwell. As for electromagnetism, the ideas of Maxwell are equivalent to those of superball theory. They are the same, in essence. Therefore if you want to construct the system of electromagnetism through superball theory, you have only to take the way that Maxwell took. If you did, you would easily get numerical formulas that constructs the system of electromagnetism.

Let's look back at the way that Maxwell took. He thought as follows.

"Space is full of micro balls. Micro balls are arranged on the way of lines of magnetic force. Each micro ball is rotating and its axis of rotation goes along with the lines of magnetic force."

Maxwell thought thus and get numerical formulas: so-called Maxwell equations. These equations has a solution. That's what we seek for.

All of results by Maxwell fit to superball theory. Maxwell's micro balls correspond to superballs of photons. Electromagnetic waves or lines of magnetic force correspond to ethereal vibration. The electromagnetic force by the field corresponds to the force by the vibrating ether. An electron that creates the electromagnetic field corresponds to an electron that breathe in and out to vibrate the ether.

Maxwell thought that the electromagnetic force is caused by the field. Then, if you got naive ideas, you might consider as followings.

"Forces of electromagnetism is caused by the exchange of particles, especially particles of magnetism. If there are two electric charges, they would exchange magnetic particles to make a force. If there is only one electric charge, it can not have a partner (another electric charge) for the exchange and it cannot get a force. Therefore, only one electric charge in the electromagnetic field gets no force."

This interpretation is not right because a force does not need the exchange of particles or resonance. The exchange of particle is not necessary nor essential. What a force needs is only the field or ethereal vibration.

Maxwell's theory and superball theory have common theoretical properties. Both of them based on almost the same idea and concludes the same equations, so that their systems of electromagnetism as numerical formulas are completely the same. Moreover, both of them attribute a force to the field, not to particles. They have many common theoretical properties. Meanwhile, they have some differences.

There is one difference between Maxwell's theory and superball theory. Maxwell's theory is just the theory for electromagnetism but superball theory is a broader theory. Superball theory contains not only the electromagnetism but also the weak interaction and the strong interaction. These three interactions should have a common principle. Superball theory

explains this with common principle. It is ethereal vibration.

Thus superball theory is a broader theory than Maxwell's theory. Moreover, superball theory suggests that we could explain the weak interaction and the strong interaction in the way of the electromagnetism. Frankly speaking, each of three types should have its own force which is caused by ethereal vibration. Of course, each of three types should have its wave that corresponds to its force. (i.e. the electromagnetic wave for the electromagnetic force, the weak interaction wave for the weak interaction force, and the strong interaction wave for the strong interaction force.)

There are three types of forces. The electromagnetic force, the weak interaction force and strong interaction force. These forces have a common principle (i.e. ethereal vibration) and therefore they can be unified. Such an unification has been already done in history, as you know. Superball theory just hints the possibility of such an unification.

Gravitational Waves

We now realize that forces of three types come from ethereal vibration. Then, what about gravity? If gravity is a force of the same type, gravity comes from ethereal vibration, so that gravity should has gravitational waves. Is it right? Perhaps, no. Nature would have no gravitational waves. Gravity would not be a force that comes from waves or ethereal vibration.

If we take it granted that superball theory is right, the following two ideas cannot be consistent.

"Gravity is a force that comes from ethereal vibration."

"Gravity is a force that comes from the gradient of density (of superballs)."

These two ideas cannot be inconsistent. If we take it granted that the latter is right, we cannot take up the former at the same time. Thus the existence of gravitational waves must be denied.

If we want to get an answer to the gravitational waves, we have only to realize this inconsistency. Then, why are they inconsistent? There is a reason as follws.

The first reason is the difference of principles of both ideas. Each idea has each principle for a force. One is "ethereal vibration" and the other is "the gradient of density". Both ideas have different principles. At the same time, both principles are based on the same foundation (superball theory). And therefore they cannot be two appearance of the same principle. Remember the Schrodinger's quantum theory and Heisenberg's quantum theory. Both theories can have different appearances and the same principle at the same time, because they are based on different foundations. However, both of the idea of "ethereal vibration" and the idea of "the gradient of density" are based on the same foundation. Both

ideas cannot have different appearances and the same principle at the same time. If they have different appearances, they must have different principles. If one principle is right, the other principle is wrong. They must be inconsistent.

Thus, we can realize this inconsistency. And therefore, gravity should not be a force of waves. Then, there remains two reasons which suggest that gravity should not be a force of waves. Both reasons are as follows.

One reason is the unsuitableness to facts. If gravity has gravitational waves, there should be the other force which makes a pair with gravity. It's like there should be the other force which makes a pair with electric force in the electromagnetism. This force is magnetic force. If gravity is a force of waves, gravity needs another force. This necessity is important. As not a few physicists knows, the combination of Maxwell's theory and the Einstein theory can prove the existence of the magnetic force. If both theories are right, magnetic force must exist in order to make a pair with coulomb force. This is a known explanation. Then, to sum up, if gravity is a force of waves, gravity needs another force. However, such a force is not discovered nor believed to be exist. Therefore, gravity should not be a force of waves.

The other reason is the unsuitableness to experiments. None of our experiments can proved that there should be gravitational waves. Indeed, such an experiment may exist if there is gravitational waves. For example, we should suppose some experiments as follows.

"The experiment in which the wavelength of a gravitational wave is observed." (It resembles the wavelength of a electromagnetic wave.)

"The experiment in which the phase of a gravitational wave is observed." (It resembles the phase of a electromagnetic wave.)

"The experiment which proves the Doppler effect for gravitational waves." (It resembles the Doppler effect for electromagnetic waves in the gravitational field.)

"The experiment which proves the gravity lens effect for gravitational waves." (It resembles the gravity lens effect for electromagnetic waves in the gravitational field.)

"The experiment which proves the untransparency for gravitational waves." (It resembles the untransparency for electromagnetic waves. Electromagnetic waves are untransparent in some substance.)

"The experiment which proves the interference of gravitational waves." (It resembles the interference in double-slit experiment. If there is some substance that have untransparency for gravitational waves, the interference of gravitational waves which come from twin gaps should be observed.)

Of course, these experiments can be carried out but they will not prove nothing. We can prove the truth but cannot prove the falsehood. All the experiments that intend to prove the falsehood should come to be in vain.

Now we know that gravity is a strong enough to be observed but no properties of gravitational waves are observed. Moreover, if there are gravitational waves, we must accept unnatural phenomena as mentioned above. Therefore we should conclude that there

would be no gravitational waves.

Let's look back. Even if we should abandon the idea of gravitational waves, we can get another idea for gravity. It's the idea of the gradient of density. This idea based on gravity model. Then what is the difference between both ideas?

When we take up the idea of gravity model, we got another idea together. It's the idea of collision. Gravity is regarded as a force that is caused by the collision of superballs. Then, what does the collision mean?

Now, let's suppose a simile. The collision of superballs is similar to a certain physical phenomenon. What's it? It's a phenomenon told in the kinetic theory of gases. This theory explain the pressure, which is a force. Molecules of gases collide against solid matter like balls collides against walls. Such a collision gives a force. The principle of this force is quite different from that of the force by waves. (in particular, the direction of a force.)

Then, what is the principle of collision? We don't need more. We have only to realize the difference of these two principle so that we should regard gravity as a force by collision instead of a force of waves. That's enough. Why so? It is because we have already got numerical formulas of the general theory of relativity, which explains the gravity numerically almost enough.

Now we not only realize the principle of gravity but also have numerical formulas of gravity. Other problems would be unimportant.

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[Supplementary Note]

Now let's compare gravity to warp and the electromagnetic force in order to realize the essence of gravity.

First of all, let's compare warp with gravity. We have already realized that both of warp and gravity are caused by collision. Then, what's the difference? It might be explained as follows.

"Warp is brought about by the collision of a particle. This collision makes waves in the ether."

"Gravity is brought about by the collision of superballs. This collision gives substance a gravitational force."

The latter suggests that gravitational force is similar to electromagnetic force. However, even if they are similar, they would have a big difference. It's this.

"Gravitational force is brought about by collision, so that gravitational force should come from longitudinal waves in the ether. Electromagnetic force is brought about by ethereal vibration, so that the force of electromagnetism should come from transverse waves in the ether. They should have the difference of longitudinal waves and transverse waves."

Warp and gravity are similar but have a difference. Gravitational force and electromagnetic force are similar but have a difference. We could realize the essence of

gravity if we realize the both difference.

Unification

Superball theory denies the existence of gravitational waves. However, many physicists of today believe Grand Unification Theory (GUT) , which suggests the existence of gravitational waves.

Of course, the aim of GUT is reasonable. We should unify all the forces in a sense. However, the way that GUT takes should not be appropriate. Why so?

GUT takes an idea that gravitational force has waves because other three forces have waves. However, it is too naive and too analogical to be reasonable. As mentioned before, gravitational force and other three forces have nothing common except that they are forces.

Gravitational force and other three forces belong to different types. This difference can be explained as follows.

"Gravitational force is caused by the gradient of the density of superballs. Other three forces are caused by the ethereal vibration."

The ether has two main properties. One is the density of superballs and the other is the ethereal vibration. Figuratively speaking, the density of air and aerial vibration. The difference of the density of air brings about atmospheric pressure, while aerial vibration brings about sounds. Both phenomena are completely different.

The density of superballs comes from the unequal distribution of superballs, which means the distortion of the space. Ethereal vibration comes from the rotation of each superball, which means the vibration of the space (or the ether). Both of them comes from different causes, so that their forces should belong to different types.

Then, what about unification? Can we unify forces of both types? The answer is No and Yes. We may say "No" in a sense and "Yes" in a sense. This can be split to two meanings. One meaning is that we cannot get unified numerical formulas that explain all forces. The other meaning is that we can get unified geometrical ideas that explain all force. Indeed, we now can get only numerical formulas of different types (i.e. of quantum mechanics and of the theory of relativity), while we now can get ideas of superball theory (i.e. an unification of quantum mechanics and the theory of relativity).

Thus, unification is not possible in the sense of numerical formulas but is possible in the sense of ideas or models. Superball theory gives the unification in the latter sense.

Then, we should compare two theories of current physics: quantum mechanics and the theory of relativity.

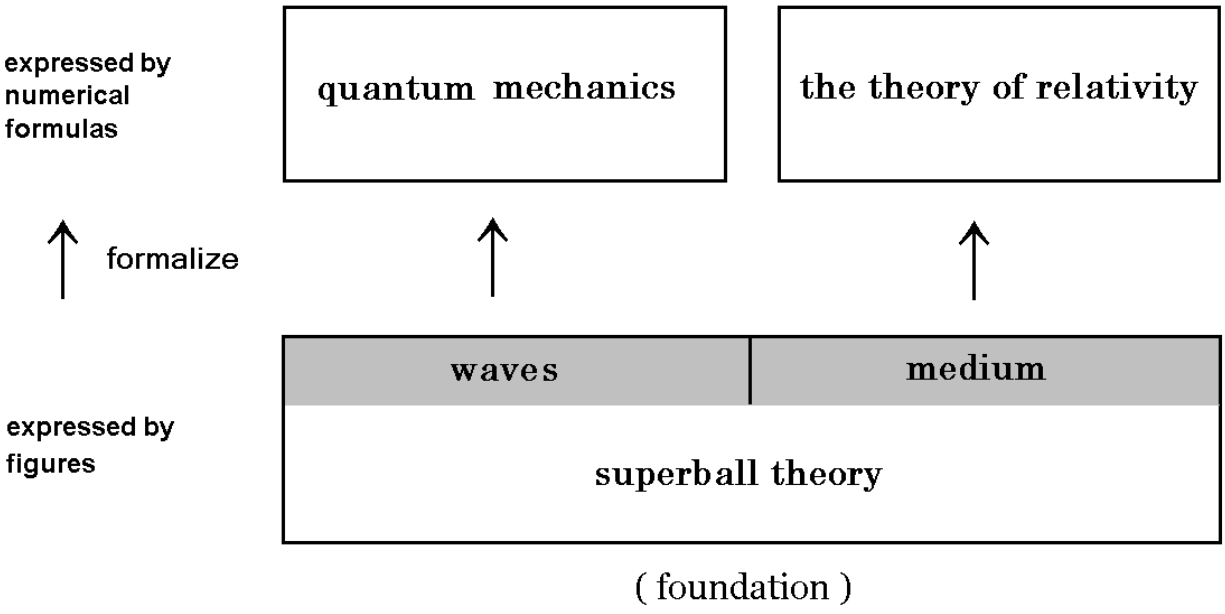
Quantum mechanics deal with three sort of forces: the electromagnetism, the weak interaction, the strong interaction. These three forces have the same principle. It's ethereal

vibration. Their numerical formulas mean the state of waves or the field. For example, Maxwell's equations means the state of electromagnetic waves or the electromagnetic field.

The theory of relativity deal with gravity. Gravity comes from a principle. It means the distortion of space, or it means the gradient of the density of superballs. Both meanings are equivalent and have the same numerical formulas.

Quantum mechanics has the numerical formulas for waves. The theory of relativity has the numerical formulas for medium. The difference of them is that of waves and medium. The former is the theory for waves, while the latter for medium. It's the essential difference.

Vibration of space gives the electromagnetic force and so on. Distortion of space gives gravity. Both of them have the difference of waves and medium.



[fig45]

We have already realized the essence. And now, we can get the figure above. The explanation for this figure is as follows.

Superball theory, which is a model expressed by some figures, lies at the bottom as a foundation. We could take up it and formalize it so that we could get numerical formulas. These numerical formulas of superball theory are equivalent to those of quantum mechanics or the theory of relativity. Thus we would get numerical formulas which are as same as those of quantum mechanics and the theory of relativity.

Superball theory is not a theory that gives numerical formulas but a theory that gives their foundation. What we have lacked so far is not numerical formulas but new ideas. What our study has lacked so far is not the equations for unified waves but the model for unified space. This model should not express how we cannot get unified waves but should express why we can get unified waves.

Supplementary Discernment

The body of what I intended to tell has been told above. I shall add some explanations as supplementary discernment, which is somewhat vague but has deep significance. That's a intuitive discernment for the essence of energy. I shall take up several basic uncertain interpretations about energy as follows.

(1) Mass Conversion

We have got the idea of the conversion of a particle and waves. This conversion means two types. One type is the conversion from a particle to waves, while the other type is the conversion from waves to a particle. What do both mean?

Then, let's suppose a warp and notice the first process. When the conversion from a particle to waves occurs, the mass of a particle would become extinct and the energy of waves would be born. We could regard this phenomenon as the conversion from mass to energy.

There would be another phenomenon of a symmetrical type. Let's suppose a warp and notice the last process. When the conversion from waves to a particle occurs, the energy of waves would become extinct and the mass of a particle would be born. We could regard this phenomenon as the conversion from energy to mass.

There could be two types. One is "from mass to energy" and the other is "from energy to mass". Each conversion of both types could be named "mass conversion".

Mass conversion means that mass of substance and energy of the ether are convertible. It's important. The theory of relativity suggests the equivalence of mass and energy, which is almost equivalent to mass conversion.

Moreover, the idea of mass conversion brings the bridge between classical mechanics and quantum mechanics. Physicists usually rewrite equations from the formula of classical mechanics to that of quantum mechanics. They have no doubt. However, why can they do such a rewriting? They might say that is it just a convenience. It's not a favorable answer. Truth should not be written by a convenience. We should take up a reasonable ground for such a rewriting. What's it? It's mass conversion.

Let's suppose a warp. As far as a particle remains to be a particle as substance, we can deal with it in classical mechanics. However, if a particle converts itself to waves, we cannot deal with it in classical mechanics but should deal with it in quantum mechanics. The difference of classical mechanics and quantum mechanics is that of a particle and waves. This change of forms urges us to change the theory from classical mechanics to quantum mechanics. This means that mass conversion brings the rewriting.

The difference of classical mechanics and quantum mechanics is not that of

approximation and accuracy but that of a particle and waves. It's the essence. The idea of mass conversion gives us the interpretation above.

(2) Energy Transition

Mass conversion means the conversion between a particle and waves. It means the change between the form of a particle and the form of waves. We could name it "the change of forms". Mass conversion is the change of forms, in a sense.

Moreover, we can find another change. We could name it "the change of positions". It is the change between the position of a particle and the position of waves.

When a warp occurs, a particle converts itself to waves. This means the change of forms. At the same time, This also means the change of positions. -- The change from the position of a particle to the position of waves.

Here, we could suppose that energy changes its position. When a particle converts itself to waves, energy should change its position from that of a particle to that of waves. When waves convert themselves to a particle, energy should change its position from that of waves to that of a particle. We could name this change "energy transition."

This is just an hypothetical idea, however, this idea hints the following interpretation.

"Force means energy transition, especially energy transition from the ether to substance."

Let's suppose there is energy transition from the ether to substance. If energy is much enough in the ether, there would come mass conversion, which means the conversion from waves to a particle. If energy is not much enough in the ether, there would not come mass conversion while there would be the floating energy as the transmission of waves. However, if energy is not much enough and it could not be transmitted farther, there should occur something. What's it? If energy could not be transmitted farther, there should be a substance as the block for transmission. This substance stops the transmission of waves and gets energy from the ether. Energy does transfer from the ether to a substance. This phenomenon is energy transition. Moreover, what we call force would be energy transition, perhaps.

For example, when a substance gets electromagnetic force, it would get energy from superballs which rotate. And for example, when a substance gets gravitational force, it would get energy from superballs which collide against substance.

Thus a substance could get energy from superballs in the ether. This phenomenon, which means energy transition, would be force. The direction of force would be that of energy transition. The size of force would be that of energy transition.

The ether that vibrates has waves and energy. If energy is much enough for a big particle, mass conversion to a big particle would occur. If energy is not much enough for a big particle, mass conversion to a big particle would not occur but mass conversion to small

particles would occur. This small particles could do act on the big particle. Such an action or something by small particles on the big particle would be force. Thus, force should be equivalent to energy transition.

(3) Negative Energy Transition

If we take up the idea of energy transition, we will find an importance. It is the difference between the energy transition of gravity and that of the other forces. Their energy transitions have different directions. The reason is as follows.

The gravity is caused by the collision of superballs. An old principle can be applicable to this phenomenon to some extent. It is the principle of kinetic theory of gases. When a molecule of gases collides against a solid body, the body gets a force. It is the pressure by gases. It resemble the gravity by superballs. However, we have something to pay attention.

Let's remember the idea of the density of superballs. The density can have a gradient. It can be gradual. Where the density is dense, the gravity is strong. Where the density is thin, the gravity is weak. The gravity has the direction from the thin space to the dense space. This is the reality.

If superballs were something like a molecule of gases, the gravity would be something like pressure, so that the gravity should have the direction from the dense space to the thin space. This is contrary to the reality. There is a contradiction. In order to avoid this contradiction, we need to take up the following interpretation.

"The force of gravity has the direction contrary to pressure. It acts in the direction from the thin space to the dense space."

This is equivalent to the following.

"There is a force which has the negative value of gravity. This force of a minus value acts in the direction from the dense space to the thin space."

This force can be named "the negative gravity". We can regard the force of the gravity in a direction as the force of the negative gravity in an opposite direction. Meanwhile, we have got the following interpretation.

"Force means energy transition."

If we recognize this to be right, we can get the following conclusion.

"The force of gravity has a direction. The force of negative gravity has the opposite direction. The force of negative gravity can be regarded as the force of gravity which has a negative value. This force is a negative force. A negative force comes from negative energy transition."

The last phrase of "negative energy transition" means the following two propositions.

"Negative energy transfers in the positive direction."

"Positive energy transfers in the negative direction."

Each of them gives the same fact. Figuratively speaking, the stream of negative electric

charge in the direction to the right and that of positive electric charge in the direction to the left gives the same result. In this case, we took up the idea of "negative electric charge". Let's imitate it and take up the idea of "negative energy". Then, we can get the following conclusion.

"The gravity is negative energy transition. It means the energy transition of negative energy. In a gravitational field, negative energy transition occurs from the dense space to the thin space, so that the negative force (a pulling force) acts on substance. The negative force is strong in the side of the dense space, while the negative force is weak in the side of the thin space. The balance after their offset or deduction is a little negative force in the side of the dense space, which is equivalent to a little positive force (pushing force) in the side of the thin space. This force is given by the space."

Thus we can explain the meanings of the gravity with the use of a new idea: the idea of "negative energy transition". Of courses, this idea is applicable only to the gravity. Meanwhile, both ideas (energy transition *and* negative energy transition) are applicable to the other forces, in case by case.

(4) Resonance and Circular Movement

Let's apply both ideas (energy transition *and* negative energy transition) to some concrete cases.

The first is the case of a substance in the gravitational field. A substance gets the force of the gravity, while it gets negative energy transition. The second is the case of an electron in the electromagnetic field. An electron gets the electromagnetic force, while it gets energy transition or negative energy transition. (the former may be named "positive energy transition".) This electron gets positive energy transition or negative energy transition, while it gets positive force or negative force. The difference of the positive and negative is dependent on plus and minus of the electric charge.

The mentioned above explains the cases of one particle in the field. Then, what about the case of two particles in the field? If there are a couple of particles of the same kind, resonance would occur. Of course, as mentioned before, resonance means the cyclic change of warps. It also means the exchange of particles. Moreover, if force is energy transition, it also means the exchange of energies.

In the case of resonance, energy would transfer in the both directions. There would be mutual transition. One particle would give energy to the other and take energy from the other. They give and take energy each other. It's a steady state.

Examples: two substances in the gravitational field, two electric charges in the electromagnetic field. In these cases, there would be an attractive force or a repulsive force, while positive energy or negative energy would transfer.

In some cases, both of a sort of resonance and another sort of resonance are balanced.

This state means the balance of forces. For example, the resonance of electromagnetic force and that of strong interaction can be balanced. This balance brings about a steady state, however, it is not the steady state of a single resonance. -- Let's take a simile. A boy and a girl loves each other. There is a stable sympathy, which corresponds to resonance. After a year, the boy and the girl loves and hates each other. There is a balance of love and hate, which corresponds to the balance of forces.

(5) Gravity and Free-Fall Movement

The idea of the balance of forces can be applicable to electromagnetic force, however it can not be applicable to gravity. Why so?

There are gravity and other forces. All of them are forces. We are apt to think they have the same principle or similar principles. We do not think they have completely different principles. Therefore, we are apt to the idea of the balance of forces to the gravity. For example, we think the Moon around the Earth has the balance of forces: the gravitational force and the centrifugal force. Then, what brings about the centrifugal force? Is the space brings about the centrifugal force while the space brings about the gravitational force? However, this idea is unnatural. The gravitational force gives the same force to everything in the same position, but the centrifugal force gives different forces to each body in the same position. The centrifugal force cannot be a force given by the space.

We had better abandon the idea of the balance of forces. We had better abandon the idea of any force. We had better took the idea of the distortion of the space. The moon does not get two forces. The moon get no force, while it moves in free fall. The circular movement of the Moon is just a free-fall movement, it means a movement without force (getting no force) .

The most ordinary free-fall movement is the linear uniform motion. A body in non-gravitational field moves on a line in uniform velocity. Another free-fall movement is the motion of a comet which passes by the side of Earth. A comet approaches the Earth a little and passes away. Its route is not a line because the comet curves a little near the Earth. Another free-fall movement is the motion of meteorite which reaches the Earth. A meteorite approaches the Earth and reaches the ground. Its route is not a line because the meteorite curves a lot near the Earth. Another free-fall movement is the motion of the Moon which keeps a circular movement around the Earth. The Moon approaches in the middle route of a comet and a meteorite. It neither passes away nor reaches the Earth. Its route is a circle.

We picked up four cases above: cases of the linear uniform motion, a comet, a meteorite, the Moon. Each of them is a cases of free-fall movement. A body in a free fall gets no force. Of course, a body in a circular movement gets no force, so that it doesn't need the idea of the balance of forces.

Thus, we can realize that the difference of the gravity and other forces. Other forces needs

the idea of "the balance of force", while gravity doesn't need the idea if it have the idea of "free-fall movement".

(6) Energy Preservation Law

We have understood the idea of "free-fall movement". This understanding is, however, somewhat insufficient. We have not yet understood the relation between free-fall movement and energy. Now, we should have a new idea: the idea of potential energy.

Let's remember a famous principle. It's energy preservation law. It gives a relation between movement and position, while it expresses the relation between kinetic energy and potential energy. The latter relation can be explained by superball theory as follows.

Firstly, let's suppose a zero gravitational field. A substance there gets no gravitational force. If the substance is standstill and is not accelerated, it should get no force nor energy transition. If the substance is accelerated, it should get force and energy transition.(It is because force and energy transition are equivalent. Something for force and something for energy transition should be the same.) Of course, there is no potential energy for gravity, and so we don't need to think of potential energy.

Secondly, let's suppose a gravitational field. A substance there gets some gravitational force. If the substance is standstill and is not accelerated, it should get gravitational force and energy transition. If the substance is accelerated in free fall, it should get no force nor energy transition. This means that if a substance increases kinetic energy, it decreases potential energy as compensation.

The second case can be explained by the idea of negative energy transition. Let's suppose a substance in a gravitational field. If it moves in free fall, it increases the momentum and kinetic energy as it decreases the potential energy. Why it decreases the potential energy? it's because it gets negative energy through negative energy transition. A gravitational field has the gradient of density. A dense space has high density and high negative energy. A substance in a gravitational field increases negative energy through negative energy transition, while it moves from thin space to dense space and is accelerated. It decreases potential energy, while it increases kinetic energy. -- This is energy preservation law. Thus, energy preservation law can be explained with the idea of negative energy transition.

Energy preservation law suggests that the sum of potential energy and kinetic energy is constant and therefore they are equivalent. This can be expressed in a numerical formula. Physicists of today can understand how the relation is determined, but they cannot understand what determines the relation. Superball theory gives the answer. It is negative energy transition that removes energy from potential energy to kinetic energy.

(7) Potential Energy

Now, let's consider potential energy. We have used the idea of potential energy, while we have not understood this idea enough. In fact, current physics cannot teach us what the potential energy is. If potential energy is an entity, it should belong to space or substance. There are two opposite interpretations. One interpretation suggests that the potential energy belongs to space, while another interpretation suggests that the potential energy belongs to substance. Current physics cannot determine which is right.

Superball theory gives another interpretation. It suggests that the potential energy is not an entity, so that it should belong to neither space nor substance. The reason comes from the idea of negative energy transition.

Now, first of all, let's consider the movement of a substance in the gravitational field. This movement is an accelerative motion, which can be expressed by an equation: Newton's second law. This equation means the following.

"The second differential of position (of substance) should be proportional to force."

Meanwhile, we have already got the following proposition.

"Force means energy transition." (force and energy transition are equivalent.)

These two propositions above brings the following proposition as conclusion.

"The second differential of position should be proportional to energy transition." (1)

Moreover, we can take up the following proposition as a conjecture.

"Energy should be determined as the integral of energy transition." (2)

These two propositions (1) (2) are conjectures. The former is a logical conclusion from some conjectures, while the latter is a mere conjecture. Both of them are just conjectures but are very important. They are great principles. We could name them "the principles of energy transition".

The first principle of energy transition is very important. It teaches us the quantity (or value) of energy transition. Energy transition is not proportional to the position or the velocity but is proportional to the acceleration (the second differential).

The second principle of energy transition is also very important. If energy transition is determined by only the second differential, energy itself should be determined by only the second differential, too. This brings the following conclusion.

"A substance gets energy only through energy transition. The energy of a substance should be determined only by energy transition. The position (i.e. height) of a substance in the space is not determinative. The position does not determine the potential energy by itself. The potential energy must be determined through energy transition. The potential energy is not a proper value for the space (i.e. position). It's just a calculated value as the integral of energy transition."

The potential energy should be determined as the integral of energy transition. If so, a potential energy as a mere integral of energy transition should have no meaning. An indefinite integral has the indefinite value because of indefiniteness of a constant. It has no meaning for the value. What has meaning is only definite integral, which has the meaning

of the difference between two indefinite integrals. For example, a definite integral in the interval between position *A* and position *B*.

It is only the difference of two potential energies that has meaning. A mere potential energy itself has no meaning. It is no more than a calculated value with an indefiniteness of a constant. No one can measure a potential energy as an entity. No one can get a specific potential energy for each position. Potential energy is not a fixed or proper value in the field. Potential energy is not a real entity but merely a supposed calculated value. What has the real entity is not potential energy but energy transition or force.

It is nonsense to ask whether a potential energy belongs to the space or to substance. A potential belongs to nothing, because it is not entity but is a mere virtual value. What can be an entity is not the potential energy but energy transition or force. Thus concludes superball theory.

(8) Momentum

What is mentioned for potential energy is applicable to kinetic energy, because of energy preservation law. As the essential factor for potential energy should be force, the essential factor for kinetic energy should be also force. Moreover, force can be written in the form of Newton's second law, which takes the second differential equation. This means that the essential factor for kinetic energy is a force as the second differential for position.

Meanwhile, current physics regards the momentum as the essential factor of kinetic energy. Indeed, quantum mechanics considers the momentum to be important. Its equations has the part which corresponds to kinetic energy, and this part is rewritten from the form of the momentum.

Such a way is not wrong, however, it's not right enough nor accurate enough. If we want to express equations more essentially, this part should be expressed by another factor instead of momentum. What factor? It's force or the second differential for position. Meanwhile, the part of potential energy should be expressed by the factor of a non-specific potential energy: a potential energy which has not a certain standard point.

This conclusion is, however, little important. It means just the rewriting of equations for the essential understanding. That's all. The contents or significance of equations should not be changed. Of course, if we use Hamiltonian as the second differential, there is no problem and there is nothing to be changed. Superball theory is not inconsistent with equations of quantum mechanics but is inconsistent with merely the ideas of current physics.

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[Supplementary Note]

The first interpretation (about mass conversion) taught us the difference of classical mechanics and quantum mechanics: the difference of a particle and waves. This

interpretation allows physicists to rewrite equations from the formula of classical mechanics to that of quantum mechanics. Then, what is it?

Physicists do such an rewriting through the replacement of factors (e.g. from momentum to an operator). Of course, it is mere convenience and has no proper reason. However, superball theory offers a proper reason: mass conversion.

Mass conversion means the change from a particle to waves. This change urges us to replace factors from momentum to an operator. It's because momentum is the value for a particle while this operator is a operator for waves. Such a replacement is inevitable if we take up the idea of mass conversion.

The idea of mass conversion brings an important idea. It is the idea of "negative energy" or "energy of minus value". If energy preservation law is valid, it should also be valid in the case of pair creation. This means that the sum of energies of a particle and an antiparticle must be zero. Consequently, the energy of an antiparticle must have minus value. Of course, in the case of the rotation of superballs, a superball must have a energy value between +1 and -1, including middle complex numbers.

As you know, an antiparticle has "positive mass" or "mass of plus value" more than zero. This means that mass cannot be preserved in the case of pair creation. Then, we can take the following conclusion.

"Energy preservation law is always valid, however, mass cannot be preserved. Therefore, energy and mass are not equivalent."

This might seems to be inconsistent with the theory of relativity. However, it's just a misunderstanding. The theory of relativity concludes that the absolute value of energy and mass are equivalent. An antiparticle should have an negative energy. Its value itself is not equivalent to the value of mass, however, its absolute value is equivalent to the value of mass. This is consistent with the theory of relativity.

In the old days, Dirac suggested that antiparticle is an empty hole in vacuum which is full of particles. Superball theory suggests it's not true. Vacuum is full of superballs, which can rotate and can give birth to a particle through mass conversion. Usually, mass conversion creates a particle because energy in the space has plus value. However, sometimes, mass conversion creates an antiparticle because energy in a local spot can have minus value by probability. An antiparticle should not be an empty hole in the space full of particles but is just a superball of a certain phase: bottom. Vacuum is not full of particles but is full of superballs.

Space or the ether is full of superballs. Each superball can rotate. There is many rotations of superballs. Then, what determines the state of these rotations? It is a wave. Then, what is a wave? It is quantum mechanics that intends to answer this question. Quantum mechanics gives equations to express a wave, especially a wave as wave function.

Quantum mechanics gives numerical formulas to express waves, while superball theory gives a model to express waves. Quantum mechanics teaches us how a quantum acts, while

superball theory teaches us what a quantum is. Each of them is insufficient. Before we investigate how it acts, we must know what it is. Without this knowledge, we might inquire into something that doesn't exist. We should get enough answers for both questions. When we get them enough, the truth will be revealed.

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[Additional Note]

The idea of mass conversion brings another interesting interpretation. It is an interpretation for a famous problem: the observation problem.

Most physicists believe that observation determines the state of a quantum. This idea suggests, in the case of Schrodinger's Cat, that observation determines reality. However, it seems to be odd and unnatural. We feel that only a sight should not determine the state of a cat because we have not supernatural power such as psychokinesis. This problem confuses physicists of today.

We have now the idea of mass conversion, which could bring a good interpretation. This interpretation is explained in two cases. Schrodinger's Cat and Double-slit experiment.

In the case of Schrodinger's Cat, the idea of mass conversion gives a suggestion as follows.

"Observation doesn't determine reality. Observation doesn't bring about the convergence of a wave function. It is mass conversion that determines the state."

This suggestion is contrary to the idea of most physicists but is accordant with the idea of most people who don't believe supernatural power. A sight should not determine whether a cat is alive or dead. The state of a cat should be determined by mass conversion instead of a sight: i.e. by an objective phenomenon instead of subjective consciousness.

Let's take up a simile. A dice (or die) is thrown and then it is hidden in a turned cup. An observer cannot see the dice in the cup but can only look at the outward appearance of the turned cut. Afterwards, the cup is removed and he gives glance. When he looked at the dice, the state of the dice is identified at the same time. Then, he thinks thus:

"When I observe it, the state of the dice is identified. My observation determines the state of the dice."

Of course, it's his misunderstanding. In fact, the state of the dice has been determined before, but he merely gets no information about it. Observation determines only his knowledge. It doesn't determine the state. Why so? Are there something else than observation? What determine the state? Of course, in the case of a rotating dice, it is the stop of the rotation of a dice that determine the state. In the case of a rotating superball, it is the stop of the rotation of a superball that determine the state. Such a stop is mass conversion. Therefore, we can take the following suggestion.

"Observation doesn't determine the state. Mass conversion determines both of the state and observation at the same time."

This suggestion is an interpretation. If we take up this interpretation, we can realize what determines whether a cat is alive or dead. It is something which stops the rotation. What's it? It's the probability of mass conversion. Mass conversion sometimes occurs by the probability, which is expressed in the form of wave function. If mass conversion occurs, it determines the state of superballs and it determines observation at the same time.

Then, what brings about the convergence of a wave function? Of course, it is mass conversion. The conversion from waves to a particle is equivalent to the convergence of a wave function. Moreover, both of them are equivalent to mass conversion. It is never observation but mass conversion that determines the convergence of a wave function. And the probability gives occurrence to mass conversion.

In the case of double-slit experiment, we might be confused by another problem. It's the problem of halfway observation.

An observer look at the screen and find interference usually. However, he can look at the double-slit on the halfway and sometimes find a particle in the gap of a single slit (of two slits). When he observes a particle there, the wave function converges. This phenomenon seems to proves the idea of most physicists. Observation seems to determine the state of a particle.

However, it is unnatural. Observation should not determine the state of a particle. The idea of mass conversion give us the truth by the following explanation.

There has been no particle from the beginning at the gap. There has been just waves at the gap. Of course, if there is no particle, observation can determine no state of a particle. However, there comes the time of mass conversion. Mass conversion occurs to make a particle appear. If a particle appears, the observer can look at it, so that he can determine the state of a particle.

This interpretation elucidates our confusion. There is not causal relationship between observation and determination, but there is merely the sameness of times. The time when observation is done and the time when determination is done are just the same. Then, most physicists become confused. They firstly realize the sameness of times and secondly, in confusion, regard the sameness of times as causal relationship.

Let's take a simile. When a scientist was walking on the roadside, he felt somewhat ill and looked back. He saw a car dashing against a wall. There occurred an accident. When he looked back and saw the scene, the accident occurred. Then, he believed as follows.

"Observation determines reality. My looking back brings about the accident."

It is a misunderstanding, of course. His looking back and the accident have no causal relationship. Both of them just occurred at the same time. It's almost all. He did misunderstand because he confused the sameness of times and causal relationship. All of this problem comes from his confusion.

Observation doesn't cause determination. In fact, something else brings the sameness of times. Something else gives observation a time and gives determination a time. Each time

is the same. It's something else that brings the sameness of times.

Something else. What's it? It is, of course, mass conversion. When mass conversion occurs, it brings about a conversion from invisible waves to a visible particle. This visualization brings about observableness. Of course, it is the observableness of a superball. It is not the observableness of a particle. Indeed, there has been no particle. However, by mistake, an ordinary physicist takes it for granted that there must be a particle from the beginning. That's the root of his mistake.

An ordinary scientist is apt to confuse the sameness of times and causal relationship, so that he believes that observation determines the state. It's his misunderstanding.

What should he do? He should not seek for causal relationship but should seek for the truth. He should not look at superficial appearance but should close his eyes in order to look at nonentity or the deep truth that is invisible.

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