

Paradigm Shift in Physics

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Abstract

It has been believed that the process of scientific reasoning in research and its conclusion in the natural science should be in phenomenological basis. However, what if physical reality that is based on phenomenological facts is not enough to explain all natural phenomena or what if physical reality is not closed by itself? In other words, what if physical reality is representing just a part of outcome through interacting with any unconceivable entities in ontological truth? After reviewing 4-dimensional complex space model, which has been introduced as an alternative way to understand physics comprehensively from classical physics to modern physics, some interesting scientific activities are discussed, which have been ignored in the name of pseudoscience, such as free electric energy generation, Hutchison Effect, and the common physical origin of the Hutchison Effect and WTC (World Trade Center) collapse in 2001.

Introduction

At the beginning of the 20th century, special theory of relativity was an important milestone in physics because it changed the physical concept of space and time. Later, theories of relativity have been a concrete foundation in modern physics with quantum physics although the natural philosophy behind the theory of relativity cannot be compatible with the one of quantum physics. Considering that physical theories frequently start with prior assumptions and/or metaphysical presumptions that depends on philosophical attitude of nature, which cannot be proved directly and/or sometimes cannot even be accepted easily

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with conventional intuitions/and or reasoning, it can be wondered how these two theories work together without a contradiction. Anyhow, new physical concepts appeared such as the duality of light, the interpretation of uncertainty principle, non-locality of wave function, etc. in quantum physics and the concepts of space and time in relativity, which could not be understood easily with conventional rationalism.

For example, in special theory of relativity light velocity is assumed to be constant in any inertial frame of reference, which could not be understood with the traditional concept of relative velocity; however, it has been proved through many experiments including Michelson Morley's experiment in 1887. The length scale in the direction of relative motion and time interval appear differently to the observer on rest frame and to the observer on moving frame, respectively. Mass is also changed to the observer who is in the relative motion to the mass object. These new physical concepts cannot be understood with traditional or conventional thinking way of physics. However, this new concept of space and time in free space (flat space) was considered with gravitation in space and generalized in general theory of relativity (curved space).

To generalize theory of relativity from *flat space* to *curved space*, the equivalence principle in general theory of relativity is an important postulate with which special theory of relativity can be applied in gravitational field. For example, a frame of reference attached on a free falling mass object in gravitational field can be thought as the pseudo-inertial frame that cannot be distinguished from an inertial frame of reference in free space because the free falling mass object doesn't feel gravitational force due to the inertial force reacting against the gravitational force and cancel it. Then, the free falling frame attached to the object can be considered as an inertial frame of reference although the relative velocity keeps being changed at every moment of free falling. Now, if these free falling inertial frames in gravitational field are compared with a reference inertial frame in which the distance from the gravitational source $r \rightarrow \infty$, thus, the relative moving velocity of the frame can be set to zero; then, naturally, it can be inferred that there should be time dilation and length contraction in gravitational field as in special theory of relativity. It is also interesting to compare gravitational red shift in gravitational field and longitudinal Doppler effect in special theory of relativity. In special theory of relativity, the frame of reference cannot be absolute frame but depends on the relative motion of observers; thus, the frame of reference is relative to each other if two frames of reference are compared. On the other hand, in general theory of relativity, time interval and length scale are dependent on gravitational field intensity in space.

In microscopic scale physical phenomena can be explained properly with quantum physics. The new physical concept is that particle's motion can be described with a wave motion. The wave function in quantum physics is interpreted as the probability amplitude of physical object concerned. However, classical physics or simply traditional reasoning cannot explain indeterminism and nonlocality in quantum theory; moreover, the physical meaning of wave function should be more than a simply classical probabilistic nature. However, the reality problem is still not clear in the theory itself.

Even in classical physics, there has been a question how two seemingly different phenomena such as faraday's law of induction and Lorentz force law explain same physical result, electromotive force induced in a closed circuit. In some cases only faraday's law of induction can explain the electromotive force; and in some other cases, only Lorentz force law can do. This means that none of two laws, neither Faraday's law of induction nor Lorentz force law, has the universality that physical law has to have. Furthermore, when a magnet - source of magnetic field - and a conducting disk are rotating together in unipolar induction experiment, it is not clear why and how the magnetic field lines are stationary in spite of the fact that the magnet is rotating. It has been known as Faraday's paradox even though Michael Faraday, himself, explained as "... the magnetic field lines do not rotate or participate in the rotational motion of the magnetic lines of force, ..." (Ricker).

Taking it one step further, although it is underneath the surface of realism or underlying metaphysical view, a thinker starts pondering metaphysical presuppositions in physical theory to have a comprehensive and common explanation for both physical mechanisms.

Presence and Existence

Thomas S. Kuhn (Wiki, Marcum, Bird) insisted that scientific revolutions can be achieved through paradigm shifts² in his book, *The Structure of Scientific Revolutions*. Then, new paradigm in physics might be an alternative way to understand physical theories comprehensively from classical physics to modern physics, such as relativity and quantum physics without being enforced to change and/or expand conventional ways of reasoning in physics. Once a paradigm shift is made in physics, clearly we should see scientific nature more than before.

Any scientific discussion and/or explanation in natural science should be logical in objectivity based on natural philosophy, which says what is true and false; what is logical and acceptable explanation; what is valid in objectivity, etc. Without a solid and sound philosophical basis the theory in natural science cannot be built all by itself with only phenomenological facts. On the other hand, the natural philosophy of quantum physics cannot go with the traditional one of classical physics and relativity; thus, the reality problem in the theory of quantum physics is still not clear (Marmet) (Wikipedia).

As mentioned before, what if physical reality is not a whole, complete in itself or it is just a part of all the truth in nature? What if we can understand physics comprehensively from classical physics to fundamental theories of modern physics -- theories of relativity and quantum physics -- together with new paradigm in physics that might be one schematic picture including ontological existence?

² a fundamental change in approach or underlying assumptions.

4-Dimensional Complex Space

The new paradigm is formulated as following: Nature has twofold worlds – real and imaginary -- in which one is phenomenological and the other is intangible in the respect of ontology but interacting with physical reality in phenomenological world; the imaginary world is completely filled with vacuum particles, each of which has positive charge, negative mass, and spin like a positron with negative electron mass. Hence, physical vacuum is not empty at all in ontological point of view. The vacuum particles are confined (bounded) in physical vacuum space with negative energy state and distributed quite closely to each other.

3D imaginary space including imaginary time and 3D real space including real time are corresponded to the imaginary world and real world, respectively. A fundamental principle is assumed in the 4D complex space (physical space) as following: To minimize any disturbance against equilibrium states in net mass density, net charge density, and net spin number density in 4D complex space, vacuum particles (negative energy particles) in the imaginary space redistribute themselves spontaneously (Kim 1997) (Kim 2008).

Physical Field and Interaction

Field in physics is physical quantity, such as force, energy, state, density, etc., to describe physical interaction in space and time, but the field has not a physical reality. In classical physics, “*spooky action at a distance*” was the explanation for gravitational interaction and electromagnetic interaction. In modern physics, it has been known that electromagnetic interaction is mediated with photon in QED (quantum electrodynamics), but now the question is how the photon knows which direction to propagate. Even though the shape of question has been changed from “*spooky action...*” to “*which direction...*”, the fundamental question still has remained. However, with the new paradigm being suggested as above the ontological reality of physical field and physical interaction can be answered.

For any positive mass object in real space, spontaneously vacuum particles redistribute themselves to minimize the disturbance of net mass density in physical space. Therefore, more vacuum particles are expected nearby the mass object than in remote. In a nutshell, it's like a nutshell with a nut inside. Similarly, ontological reality of time independent electric field or magnetic field can be understood as the results of redistribution of vacuum particles to get equilibrium in net charge density or net spin number density in 3D complex space, respectively.

For a mass object in real space the reaction of vacuum particles in 3D imaginary space cannot be perfect for the equilibrium of net mass density in physical space because the redistribution of vacuum particles generates a disturbance of net charge density. Similarly, for a charge object in real space the reaction of vacuum particles also cannot be perfect for the equilibrium of net charge density in physical space because the redistribution of

vacuum particles generates a disturbance of net mass density. However, from the fact that electromagnetic interaction is much stronger than gravitational interaction in physical reality (Perkins), it can be inferred that the reaction of vacuum particles for a charge in real space is much stronger than the reaction for a mass object. Although it is not quantitative explanation, a qualitative one for physical interactions, such as gravitational force, electric force, and magnetic force, etc. can be found as following.

Gravitational interaction between two mass objects is considered as a field-to-field interaction, in which the field is the physical representation in real world for the redistribution of vacuum particles in imaginary world as a result of spontaneous reaction to make uniform net mass density in physical space.

As mentioned before, vacuum particle has three basic elements – negative mass, positive charge, and spin. It is indispensable to generate a disturbance of other element and/or elements to make a uniform net density of one element in physical space.

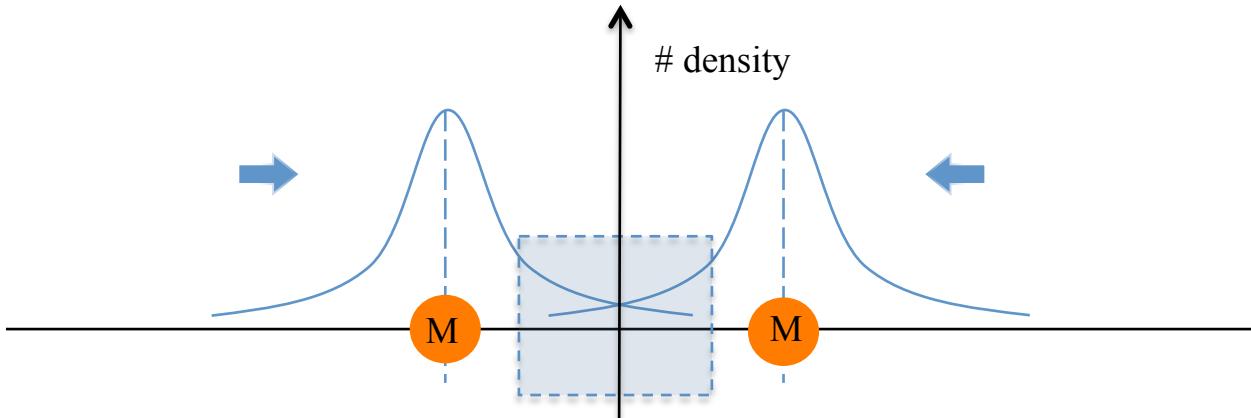


Figure 1

For example, to make a uniform net mass density in physical space, a disturbance of net charge density must be followed; and to make a uniform net charge density in physical space, a disturbance of net mass density must be followed, in turn. However, the reaction of vacuum particles against a disturbance of net charge density is much stronger than a disturbance of net mass density in physical space.

Now, we can find an explanation why gravitational force is attractive. A schematic drawing of gravitational interaction is shown in Figure 1, in which the number density of vacuum particles is shown at around two mass objects. In the Figure, the number density in shade area between two objects is roughly two times higher than the other sides; then, the charge disturbance in the shade area is getting predominant factor. Since net charge equilibrium is predominant to net mass equilibrium in physical space, the number density of vacuum

particles in the shade area should be reduced; then, surrounding vacuum particles push two mass objects to each other.

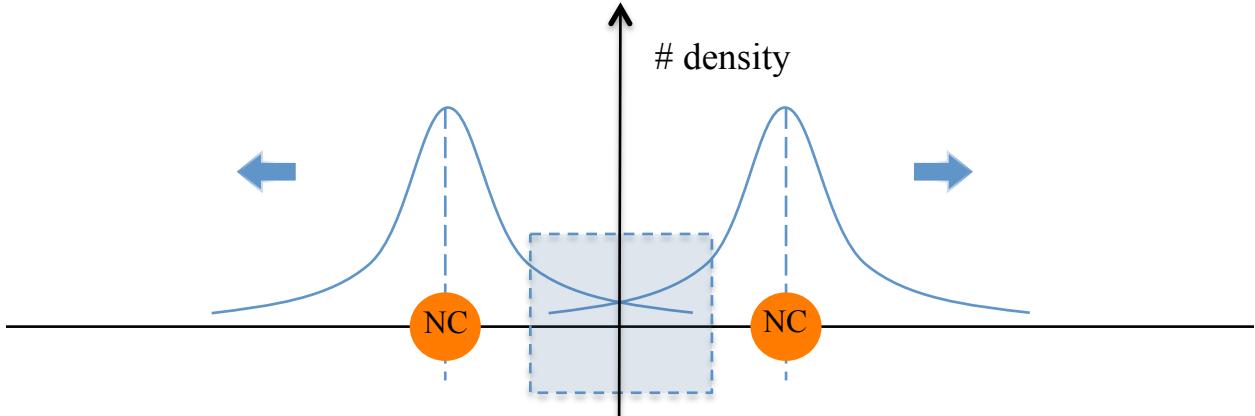


Figure 2

In Coulomb's law, the interaction between two charges of same sign is repulsive; two charges of different sign, attractive. Figure 2 shows the electrostatic interaction between two negative charges. In the shade area the number density is increased as in the case of gravitational interaction in Figure 1; however, the number density of vacuum particles in the shade area cannot be reduced due to the physical charges, two negative charges; hence, the higher number density of vacuum particle in the shade area makes two negative charges push away from each other.

Now, what if two electric charges are different kinds? It is straightforward as shown in Figure 3, in which the number density in shade area is reduced; and then, surrounding vacuum particles that have higher number density push two charges to make them closer.

A schematic drawing in Figure 4 represents magnetic fields at around a line current (I) flowing upward along the centerline. Magnetic field (\vec{B}) is shown in both sides of the line current; circles with spinning direction represent the number density of vacuum particles realigned to minimize the current effect in physical space. The size of circle is proportional to the number density of realigned vacuum particles, in which the number density can be expected as $\# \text{density} \propto \rho^{-1}$; hence, \vec{B} is also expected as $B \propto \rho^{-1}$. In other words, magnetic field is a real world representation of counter current effect generated by vacuum particles. Here, a vacuum particle is assumed as a spinning ball of which its positive charge is distributed on the surface – a sort of classical picture.

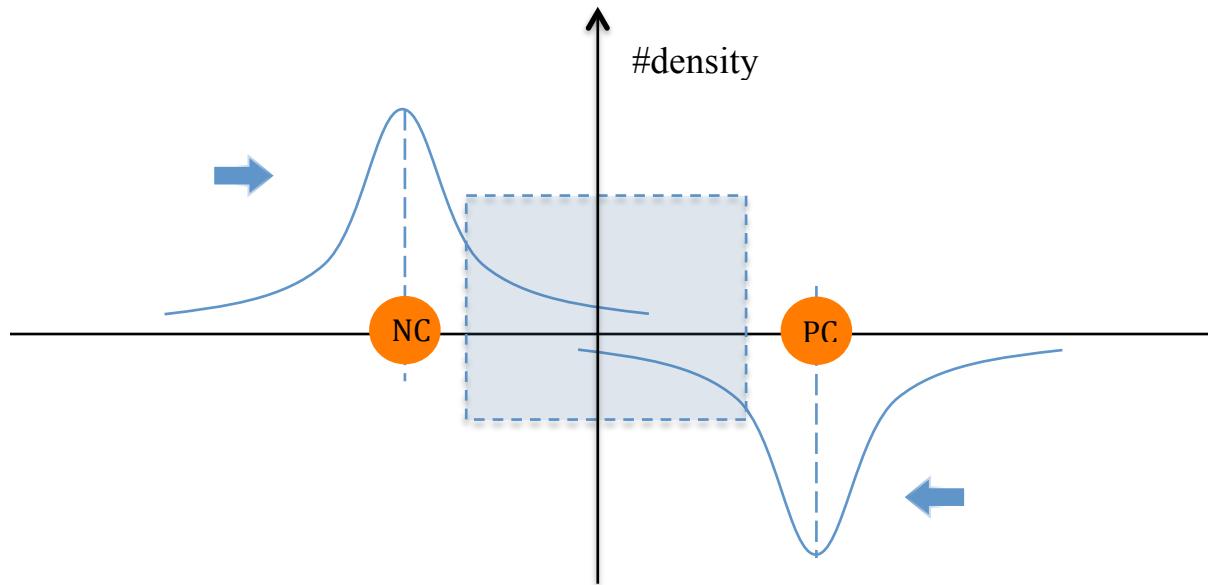


Figure 3

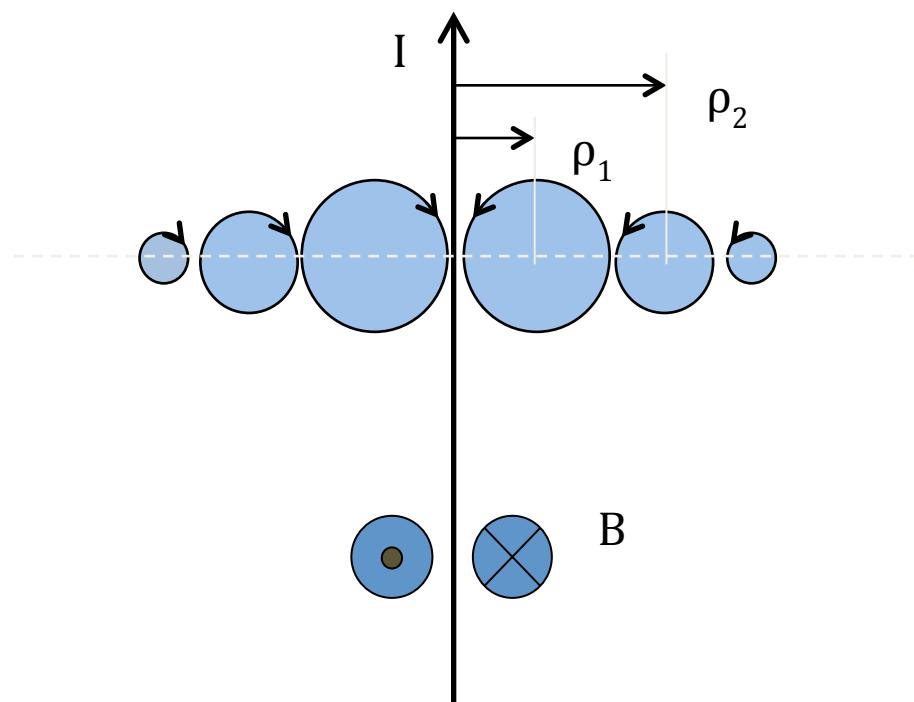


Figure 4

However, magnetic vector potential \vec{A} , which is related as $\vec{B} = \nabla \times \vec{A}$, is interpreted as an accumulated counter current effects generated by vacuum particles in physical space. As being notified from physical interpretation of Aharonov-Bohm effect (AB_effect), the magnetic vector potential is not an arbitrary mathematical function introduced in physics as a convention, but the representation of electromagnetic property about the rearranged vacuum particles against the current effect in physical vacuum space. Now, it is natural to accept the magnetic flux quantization in the interpretation of the effect.

Magnetic force on a current loop or on a moving charge under the influence of magnetic field (\vec{B}) also can be explained with the reaction of vacuum particles to minimize a current effect in physical space.

Inverse square law

It is not so difficult to figure out that the long-range forces in physics, such as gravitational and electromagnetic forces, should be represented with inverse-square law. Although physical reality of the field in physics cannot be grabbed, the inverse-square law can be deduced from phenomenological facts.

Electrostatic field is defined as the electrostatic force given to unit positive charge by electric charges or distribution in space; therefore, it is a vector quantity coming out of positive charges and going into negative charges. If the field is traced in space, electrostatic field lines can be constructed in space, in which the field lines are always coming out of positive charges and going into negative charges. The total number of field lines should be conserved and directly proportional to the total electric charges in space. Naturally, it is interpreted that field line density is proportional to field intensity in space; moreover, total number of field lines must be conserved. Now, the electrostatic field generated by a point charge can be investigated using divergence theorem applied on a spherical surface with the charge at the center of the spherical shell; then, simply it is deduced that electrostatic field intensity is inversely proportional to the squared distance from the charge. With a similar argument the inverse square dependency of gravitational field intensity is also understood.

For physical quantity such as mass, charge, or current in real space, the reaction of vacuum particles generates physical field for each physical quantity. For instance, vacuum particles are trying to get close to a negative charge in real space to shield the negative charge. The distribution of vacuum particles should be like $\rho(r) \propto 1/r^5$ since electric field is proportional to the amount of source charge and $1/r^2$. By the same token, vacuum particle distributions for gravitational field and magnetic field in macroscopic scale should be the same as in the electric field since $F \propto 1/r^2$.

Classical Physics

One of basic principles in classical physics is the law of inertia (Newton's first law) considered as a fundamental property of nature. However, the origin of the inertia can be found in new paradigm in physics as following: If a physical object is in motion, the interaction with vacuum particles also is moving with the physical object in a pulse mode made with a bunch of vacuum-particle-string waves. This means, the momentum of the physical object is carried by the vacuum-particle-string waves. Hence, in classical mechanics, the kinetic energy of physical object is the representation of vacuum-particle-string waves interacting with the physical object; potential energy, of non-uniform distribution of vacuum particles made in physical vacuum space. Now, if the physical object is enforced to change its state of motion, the interacting vacuum-particle-string waves react on the physical object against the change of state, which appears as the inertial force in physics.

On the other hand, magnetic field \bar{B} is interpreted as the phenomenological outcome of spontaneous spin reaction of vacuum particles against any dynamic state of electric charges or, simply, current effect in physical vacuum space. Moreover, the comprehensive explanation for both, Faraday's law of induction and Lorentz force law can be found with one basic principle in physical vacuum space, in which vacuum particles react to minimize any disturbance made by a physical current or moving charge under the influence of magnetic field.

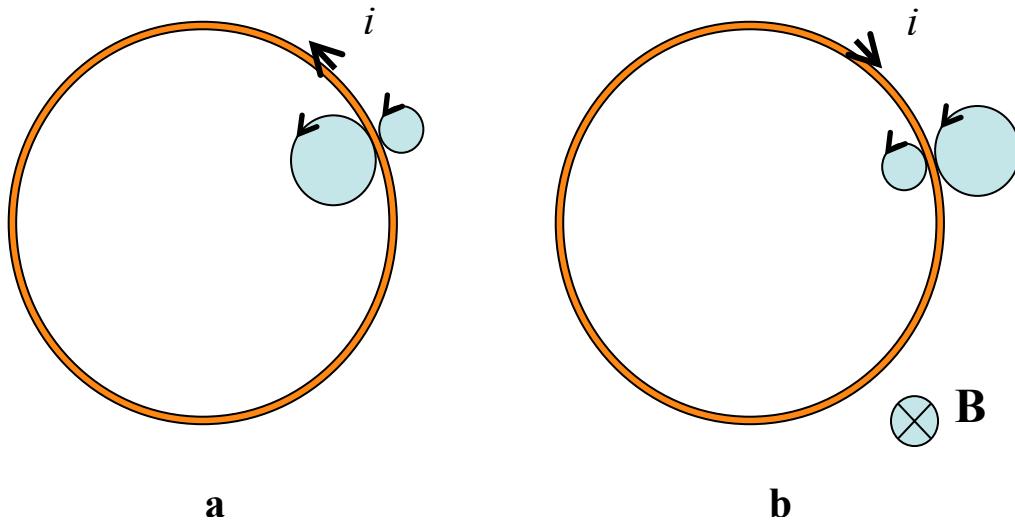


Figure 5

Figure 5 describes two loops of wire, in which circle with an arrow represents the aligned spin number density of vacuum particles; the size of circle is proportional to spin number density; and the arrows on the loops indicate the direction of induced current. If magnetic flux through the loop of wire is increased (a) or decreased (b) in figure 5, spin number densities inside and outside of the loop becomes different; then, the excess spin effect on the loop is accumulated along the loop of wire; hence, electromotive force (emf) is generated in counter clockwise (a) and clockwise (b), respectively.

Figure 6 shows an electric charge (q) moving upward under the influence of magnetic field (\vec{B}) in which the direction of magnetic field is going into the page. Against the dynamic disturbance (current effect) made by the electric charge, the spin reaction of vacuum particles is made in downward direction on both sides of the charge in the figure. Then, the aligned spin number density on left hand side (LHS) is smaller than on right hand side (RHS); thus, net force (\vec{F}) is generated by unbalanced spin number density of vacuum particles as shown in the figure.

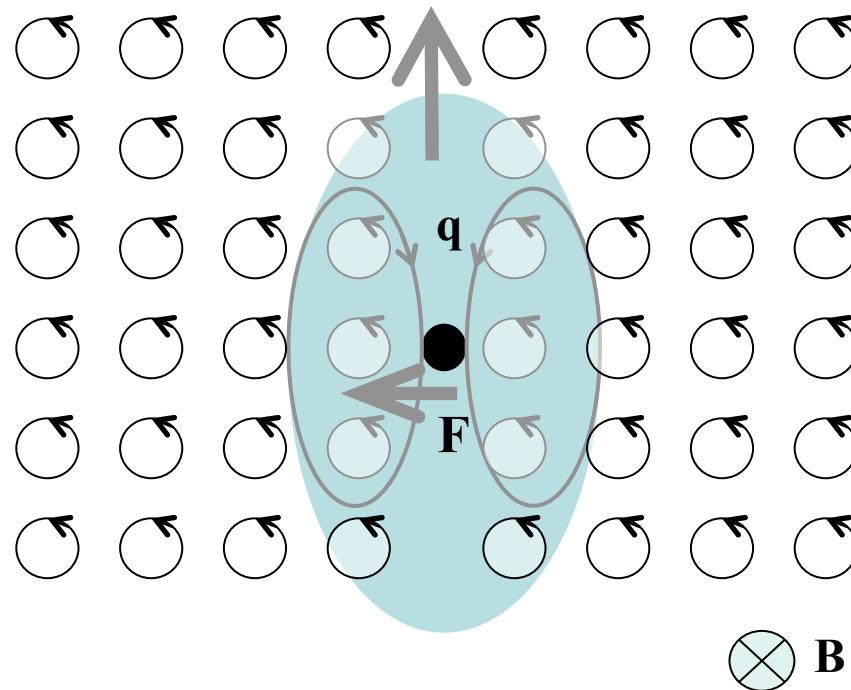


Figure 6

Interpretation of relativity

Once the twofold of nature, real world (physical reality) and imaginary world (ontological reality), and the interaction between two worlds are suggested as new paradigm in physics, a mathematical space is given as 4-dimensional complex spaces, in which the imaginary space is completely filled with vacuum particles, those of which are negative energy positrons – bounded in the space. Vacuum particles are interacting with physical objects in real space, and the interaction is realized in real space through U(1) transformation in complex space.

Although the wavelike property of light has been known in classical physics for a long time, there has been no clear explanation for the absence of physical medium for light wave. Moreover, the speed of light that is independent of observer's relative motion to light source is also one of fundamental questions. In new paradigm of physics (Kim 1997), light energy is transmitted as a bundle of vacuum-particle-string waves, in which the string is made with vacuum particles in the imaginary space. The motion of vacuum-particle-string wave in imaginary space is independent of the motion of observer relative to the light source in real space due to orthogonality in the space. Moreover, light speed is determined from tension of vacuum-particle-string and density of vacuum particles; hence, it is natural to say that the speed of light should be a universal constant if we can assume homogeneity in imaginary space.

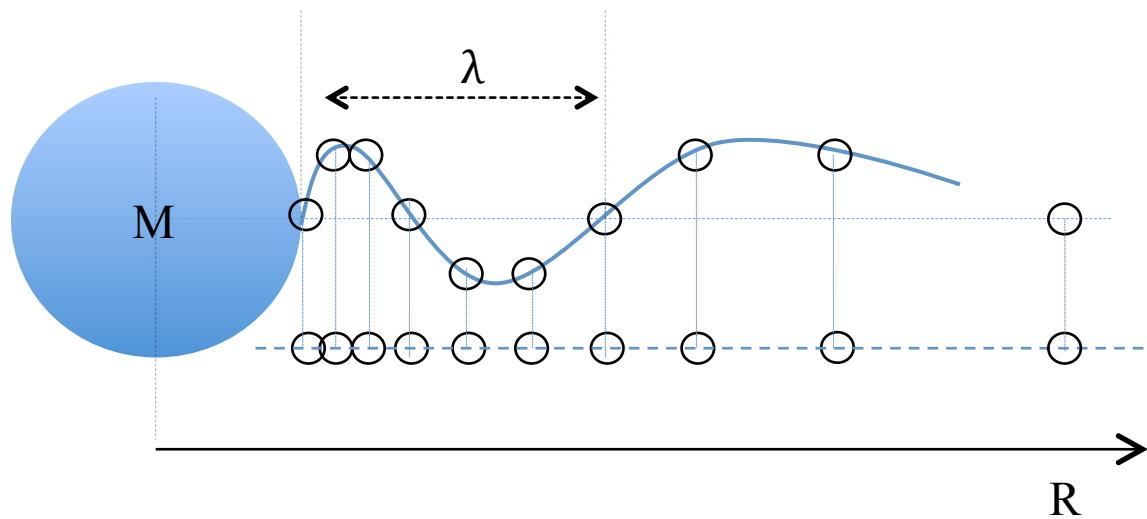


Figure 7

In special theory of relativity, the time dilation and length contraction can be explained with analyzing one-dimensional motion between light source and observer that is represented in one-dimensional complex space. Relativistic energy formula, which is given as a root-sum-square of rest mass energy and kinetic energy as $E = \sqrt{(m_0c)^2 + (pc)^2}$, is also understood with U(1) symmetry asserting energy conservation in one-dimensional complex space, where rest mass energy is on real axis; but kinetic energy is on imaginary axis because the physical momentum or kinetic energy of physical object is in imaginary space in which vacuum particles are interacting with the physical object.

With one pictorial description as shown in Figure 7, gravitational redshift and curved space in general theory of relativity can be explained. In the presence of an astronomical object with mass M, the distribution of vacuum particles is shown as in Figure 7. The higher number density of vacuum particles is shown, the stronger gravitational field strength is shown as expected. Furthermore, relativistic effect -- time dilation and/or length contraction -- is getting smaller as moving away from the astronomical object. Then, it is natural that time scale and length scale are not uniform in space with gravity but changed, which means the curved space in general relativity. Light is a form of energy transmitting through vacuum-particle-string waves in imaginary space. Then, if light emits from the astronomical object, the wavelength in vacuum-particle-string gets stretched out as shown in the figure -- gravitational redshift.

Quantum Physics

If ontological reality of light is wave as mentioned above; then, it is interesting how the particle-like property of light can be explained. For each vacuum-particle-string wave, the amplitude of wave is supposed to be constant that depends only on internal geometry of imaginary space; thus, the amount of energy transferred per unit time is dependent on light frequency only. In modern physics, photon energy ($E_\gamma = h\nu$) is interpreted as the energy contained in one wavelength λ in a vacuum string wave. In other words, photon is the energy unit of light that is critical in interaction with matter. For instance, a bounded electron in photoelectric effect interacts with one vacuum-particle-string wave (selectivity) for a time scale passing one wavelength of light (time window). These characteristics such as the selectivity and the time window show the particle-like property of light. Hence, light can be considered as a stream of photons in photoelectric effect or similar experiments. However, particles also have the duality. For instance, for high-energy electron, energy can be expressed as $E \approx pc$ in which $p \gg m_0c$; then, the wavelike behavior of electron can be described as $\lambda = \frac{h}{p}$ (de Broglie wavelength), in which the wavelike behavior is come from vacuum-particle-string waves interacting with the electron. This wavelike behavior is dominant in microscopic scale high-energy physics and described effectively with quantum physics.

In quantum physics, ontological reality of wave function is interpreted not as physical object itself in real space but as vacuum-particle-string waves interacting with it. In other words, nature itself has intrinsic statistical property that is realized through quantum physics (Kim 1997). Then, it is straightforward to accept uncertainty principle, nonlocality, wave function collapse, etc. in quantum physics. Moreover, it is not so difficult to find explanations for many fundamental questions about quantum reality such as Copenhagen Interpretation, indeterminism, Schrödinger's cat, Einstein's moon, etc. and about nonlocality and interference of wave function such as EPR (Einstein-Podolsky-Rosen) paradox, Bell's inequality, double-slit experiment, etc.

Mass-Charge Interaction

New paradigm in physics must be a scientific revolution. Not only do it offer a comprehensive explanation from classical physics to modern physics, but also it couldn't be better if it predicts something new that never could be expected before.

Ontological reality of field in physics is in imaginary space, in which vacuum particles react to minimize any disturbance in physical space. Although gravitational field intensity is so weak compared to electric field intensity, vacuum particle distribution for mass object -- gravitational field -- is similar to the distribution for negative electric charge -- electric field. Considering that physical interaction is field-to-field interaction, there should be a mass-charge interaction.

PVN (primitive-virtual negative) charge was introduced for the mass-charge interaction, and the interaction effect was searched in macroscopic phenomena such as electric field on surface of the earth and the earth's main magnetic field with an alternative model. The geophysical phenomena (earthquakes, plate tectonics) and unsettled phenomena (antigravity phenomenon, gravitational anomaly during solar eclipse, etc.) were investigated (Kim 2008). Moreover, the possible electric interaction between storm cloud and crustal conducting body underground was investigated in Tornado, which is a peculiar meteorological phenomenon on the Earth (Kim 2010).

Electric energy from physical vacuum space

The law of conservation of energy has been believed as the first principle in physics. Simply, this means that nothing can be made out of nothing. However, we have to acknowledge that it is based on empiricism and we need to understand clearly how the nothing should be defined in reality.

With new paradigm in physics, the ontological reality of physical quantities and interactions has been figured out. Physical objects keep interacting with vacuum particles and cannot be singled out without disturbing them. Then, one step further, it is desirable to investigate whether energy source and/or energy sink can be possible in physical vacuum space or not.

About free energy device or free electric energy generator, many researches have worked even though none of them has not been openly accepted or not even discussed in contemporary physical society. Just because there is no plausible or acceptable theory to explain the experimental results or simply because of the dogmatic belief saying that law of conservation of energy cannot be violated in any case, those pioneering works have not been considered seriously and thus simply ignored in public. Naturally, those pioneers and their works have been in the dark side of science. However, some of them have shown their works through public websites (DePalma, N-Machine) (Bearden) (Naudin) (Tewari), and a brief history of their pioneering works and even suppressions can be found at somewhere else (Peter Lindemann), it is not an official record though.

Anomalous Electromagnetic Interaction

As mentioned before, the vacuum particles in physical space (ontological reality) interact with physical phenomena (physical reality). In usual, the vacuum particles react in passive way against any change in phenomena, in which all scientific paradigms including physics have been setup; however, it is also interesting to investigate whether or not vacuum particles interact with physical reality in active way.

Although it is not even clear whether the experimental results can be reproduced or not, John Hutchison has claimed quite interesting experimental results since late 1970s. It is paranormal phenomena, so-called Hutchison Effect, such as teleportation, jellification of metals, spontaneous levitation, etc. (RationalWiki, Hutchison). It seems that not only John Hutchison himself doesn't know why and how it happened; but no one also has had even a clue for the phenomena, yet.

In classical mechanics, as mentioned before, kinetic energy and potential energy of a physical object is the phenomenological representation of vacuum-particle-string wave motion following the physical object and of distortion in physical vacuum space (non-uniform distribution of vacuum particles) made by physical interaction, respectively. Considered that physical fields and physical interactions are uniquely related to the distribution of vacuum particles, each of which has three basic elements as negative mass, positive charge, and spin, the kinetic energy (vacuum-particle-string wave motions) and the potential energy (distortion in vacuum particle distribution) in classical mechanics should be, possibly, made by using electromagnetic interaction alternatively. Then, it is quite interesting to investigate what on earth can be happened on a physical object inside the physical space.

However, it has been known as “The Hutchison Effect occurs as the result of radio wave interferences in a zone of spatial volume encompassed by high voltage sources, usually a Van de Graff generator, and two or more Tesla coils.” (Wood and Hutchison) (Solis). Besides, there is a quite interesting fact in the Journal of 9/11 Research (Wood and Hutchison) in which Dr. Judy Wood compared the Hutchison Effect with the weird phenomena found at or vicinity of the World Trade Center (WTC). No wonder people starts pondering how it is possible; especially, those who have concerned to find a reasonable explanation for the collapse of the WTC if possible; otherwise, to get any acceptable or even a plausible explanation keep asking themselves how these two events, which apparently had no relation to each other, generated quite similar phenomenological results. Surprisingly, in classical physics we can find a similar case as above. It is Faraday’s law of induction and Lorentz force law, those of which are apparently two distinctive phenomena but related to same physical phenomenon. However, both physical laws could be understood with one basic principle in physical vacuum space (pp. 9).

Once the mass-charge interaction was introduced (pp.13) (Kim 2008), it was natural to consider electric equilibrium among all the stars and planets in space. For example, the earth in solar system is electrically connected from interior of the earth, through the atmosphere of the earth, and to outer space although mainly to the Sun. Also, electromagnetic interaction is, supposedly, always accompanied in weather phenomena in the atmosphere and geophysical phenomena inside the earth. However, one of peculiar weather phenomena on earth is tornado because the formation of tornado cannot be explained clearly just with meteorological consideration. Hence, the driving mechanism of tornado was considered as the electric interaction between storm cloud and crustal conducting body underground (Kim 2010).

By the way, there was a strange weather event on May 26, 2016 on which a strong tornado bent railway tracks (Sott.net, NWS, Strangesounds.org). It is questionable how people in meteorology or science in general can explain for that event. Interestingly, it has been reported that earthquake also can twist railroad tracks (GIZMODO, McSaveney). Where is the magic hand to twist the railroad tracks like spaghetti noodles?

If the collapse of the WTC is considered with background information accompanied, such as weather anomaly, geomagnetic field fluctuation mentioned in the Journal 9/11 Research, and seismic data (Rousseau) (Rousseau 2012) (consensus911.org) (MacQueen), it is not such nonsense and not even surprising to say that the collapse of the WTC might be related to an anomalous electromagnetic interaction as in the Hutchison Effect.

In addition, it is also interesting to review some antigravity experiments done by pioneering researchers, such as Thomas Townsend Brown (Brown), George Piggott (Rex Research), and others (American Antigravity) considering that gravitational field interacts with electromagnetic field, and vice versa (Kim 2008).

Summary and Discussion

In science, a theory with no supporting experiment has not scientific credibility; on the other hand, an experimental result without being explained by a theory is just a bunch of data waiting for analysis, it can be a pioneering work for the future, though. In scientific work, theory and experiment, both are necessary and should be in complementary to each other. Scientific theory should be predictable and testable with phenomenological facts – falsifiability (Shea, Wikipedia, Shuttleworth). Furthermore, new theory should comprise old one with extending its domain of applicability or generality; sometimes, new theory unifies old theories together and/or makes a theoretical bridge among them.

With the 4-D complex space model suggested as physical space, principal theories in physics, such as classical physics, theories of relativity, and quantum physics, can be understood comprehensively with one basic principle applied in the physical space. Besides, a couple of groundbreaking new physical concepts appear, which never have been thought in physics and is not even possible in contemporary paradigm of physics. First of all, mass-charge interaction is appeared naturally when the one basic principle is applied in the physical space. Moreover, now we have a clue to challenge the law of conservation of energy. It has been a long time in which, in the name of pseudoscience, researches of antigravity and free energy were put into the dark side of science in which they never ever deserve to be.

The philosophy of natural science has been changed with scientific developments; natural science also has been developed on the basis of natural philosophy. In other words, the criterion to distinguish science from pseudoscience is made by human beings; at the same time, the limit of the criterion has been challenged by the same human beings. This means, there is no absolute criterion to distinguish science from pseudoscience. The falsifiability (Wikipedia) is a traditional one to distinguish science and pseudoscience; however, it is not sufficient for the criterion if the paradigm shift is considered in *The Structure of Scientific Revolutions* that characterizes a scientific revolution (Wiki), which means that today's pseudoscientific activity can be acknowledged as a scientific activity in the future with new scientific paradigm. To put it another way, it is like that we cannot see the outside well until we get there. Anyhow, It's about time to show that those pioneering researches are not in the category of pseudoscience any more.

It is also interesting to review cosmology and astrophysics with the new paradigm in physics suggested as above, such as the origin of the universe -- the Big Bang theory, contemporary prevailing model, and other alternatives; dark matter and dark energy, of which the physical reality needs to be reviewed from the beginning; and universal constants, which have been supposed to be invariant, for example, fine-structure constant α (Astro).

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