

Exploration of a Theory of Everything

Henok Tadesse
Email: entkidmt@yahoo.com

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Abstract

This paper reveals a hint to the deepest mystery of the universe. Why are the laws of the universe the way they are? For example, why are the mass and charge of the electron what they are? The laws and phenomena of the universe are predetermined by the initial fine-tuning of the internal dynamics of every elementary particle in the universe.

Introduction

We know that every object or particle with mass in the universe has gravitational interactions with every other object or particle in the universe. We also know that oppositely charged particles attract each other, while particles with similar charges repel each other. Physics tells us that there are four fundamental forces in the universe: electromagnetic, gravitational, the strong and the weak nuclear forces. The interactions are thought to be carried out by exchange of force particles (photons for electromagnetic forces, gravitons for gravitational force). In this paper, we propose a new theory for the origin of all the laws and forces in the universe.

Electrostatic forces

One of the deep unsolved mysteries in physics is the origin of the electrostatic force. The speed of electrostatic force is also one of the most confusing problems: finite or infinite? It is believed that the origin of the electrostatic force is the continuous exchange of photons. One of the puzzles is: what is the origin of these photons? Mainstream physics neither asks nor tells us anything about this. The puzzle is that we know that photons are emitted only by accelerated charges, but we also know that electrostatic force exists between two *stationary* electrons. We briefly introduce a new theory as follows.

Each elementary particle (for example, an electron) is not a point particle but exists spread in a finite region of space. An analogy would be a water pond. Each electron is an electron ‘pond’ with mass /charge density distribution. Just like a pond is never still because of the waves, the electron pond is fundamentally never static. The electron ‘pond’ is a dynamic system with waves of electron mass/charge density. The electron pond has infinite internal degrees of freedom.

Therefore, even if the electron is conventionally stationary, i.e. it is not moving/accelerating as a whole, it is a dynamic system, with the center of mass/charge continuously changing. We propose that this intrinsic motion of the center of mass of the electron is the cause of the emission of photons (force particles) from conventionally stationary electrons. These emitted photons are the cause of electrostatic force. Static magnetic field may also be explained by a similar theory. A moving charge will always produce a magnetic field (modified electrostatic field), by “coincidence”.

Origin of charge of elementary particles

What is the origin of the negative charge of the electron? Why and how does an electron repel another electron but attract a proton, i.e. what is the *mechanism*? So far physics neither explicitly asked nor answered such questions.

So what is the negative charge of the electron, i.e. what is the physical explanation/mechanism? What is the physical explanation/mechanism of the positive charge of the proton?

The mystery of the charge of the electron is possibly revealed as follows. An electron A repels another electron B just because it always emits the photons in such a way that the photon pushes electron B *away from* electron A. Similarly, an electron attracts a proton just because it always emits the photons in such a way that the photon pushes the proton *towards* the electron.

This means that if a photon emitted from an electron A is to hit (is *aimed for*) another electron B, the photon is emitted in such a way that it will push electron B away from electron A. If a photon emitted from an electron is to hit (is aimed for) a proton, the photon is emitted in such a way that it will push the proton towards the electron.

Thus, there is no (necessarily) fundamental difference between elementary particles with opposite charges, for example the electron (negatively charged) and the positron (positively charged). Their difference is only because of the way each is destined to emit photons.

Let us use an analogy. Consider three identical persons in a room: A, B and C with some balls. Person A and person B are “negatively charged” and person C is “positively charged”. At first let A and B be in the room. Each has balls. Since A and B have “same charge”, each throws balls *directly* at the other, and therefore pushing the other *away from* themselves. Next, let A and C be in the room. Since A and C are “oppositely charged”, A throws the ball not directly at C, but towards the wall, so that the ball will hit C after bouncing off the wall, in such a way that C is pushed *towards* A, as shown in the figure below. (The same applies to C).

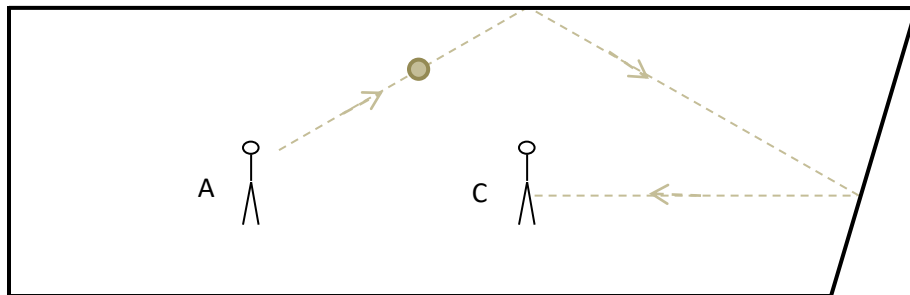


Fig. 1

We can see that there is no fundamental difference between A, B and C. The difference between them is only because of the *rules*. The rule says that whenever A sees B, he throws the ball directly at him to push him away (because they are “similarly charged”) and whenever A sees C

he throws the ball towards the wall in such a way that the ball bounced off the wall will hit C and push him towards A. This means that if the rules were changed A and B could be made to have “opposite charges” and A and C to have “similar charges”, or all of them could be made to have similar charges. But we assume that the rules are always the same and do not change because nature does not change the charge of the electron which is always the same.

But how do particles with opposite charges actually attract each other? The mechanism of particles of similar charges repelling each other can be visualized conventionally at least if we think of the particles ‘throwing’ force particles (photons) directly at each other. The current view of the motion of particles (such as electrons) is the classical view that particles/objects moving in a straight line unless acted upon by a net external force. Based on classical and current conventional thinking, the motion of the photon (force carrier) is also assumed to be in a straight line because that light travels in a straight line is a universally accepted fact. Later we will make a distinction between force carrier photons and light photons. But apart from their distinction, both have similar properties. This is to say that it is impossible to visualize the electrostatic attractive force (unlike the repulsive force) with the classical and current conventional view that photons (light photons or force carrier photons, but in this particular case we are talking about force carrier photons) travel in a straight line. The new theory proposed in my previous paper [3] about the motion of elementary particles can explain the electrostatic attractive force and this can be seen as an indirect evidence of the new theory.

In the paper [3], it was proposed that elementary particles (electrons, photons, gravitons, etc.) fundamentally do not travel in a straight line. They travel in curved paths with continuously changing instantaneous velocity along their path. That light travels in a straight line and that particles with mass travel in a straight line in the absence of a net force (Newton’s law of inertia) is only apparently correct, but fundamentally wrong. But this hypothesis that elementary particles move in curved paths is inaccessible to physical experiments to test. Although not possible to test this hypothesis directly, there is one indirect evidence for it: it is a compelling theory as a mechanism for electrostatic attractive force.

In Fig. 2, the *mechanism* of attractive and repulsive forces on Q_2 by Q_1 has been shown. Note that, even for the repulsive forces, the photons generally (almost always) travel in curved paths (red curve). To charge Q_2 , the direction of the repulsive force is *as if* the photon came in a straight line from Q_1 because the tangent line to the photon path at Q_2 passes through Q_1 . The strength of the photon is also fine-tuned according to Coulomb’s law. (However, perhaps this requirement about the tangents may be based on classical or conventional view and may need to be reconsidered for the quantum level.)

The mechanism of the attractive force by Q_1 on Q_2 is shown by the blue curve. The path of the attractive photon is such that it pushes Q_2 towards Q_1 , as shown.

Note that the forces on Q_1 by Q_2 is shown in gray color not to obscure the diagram. It can be seen that the tangent line to the gray curved paths at Q_1 pass through Q_2 . Note that the path of any individual photon is almost always unique. For example, the path taken by an attractive photon emitted at time t_1 is generally different from the path of an attractive photon emitted at t_2 .

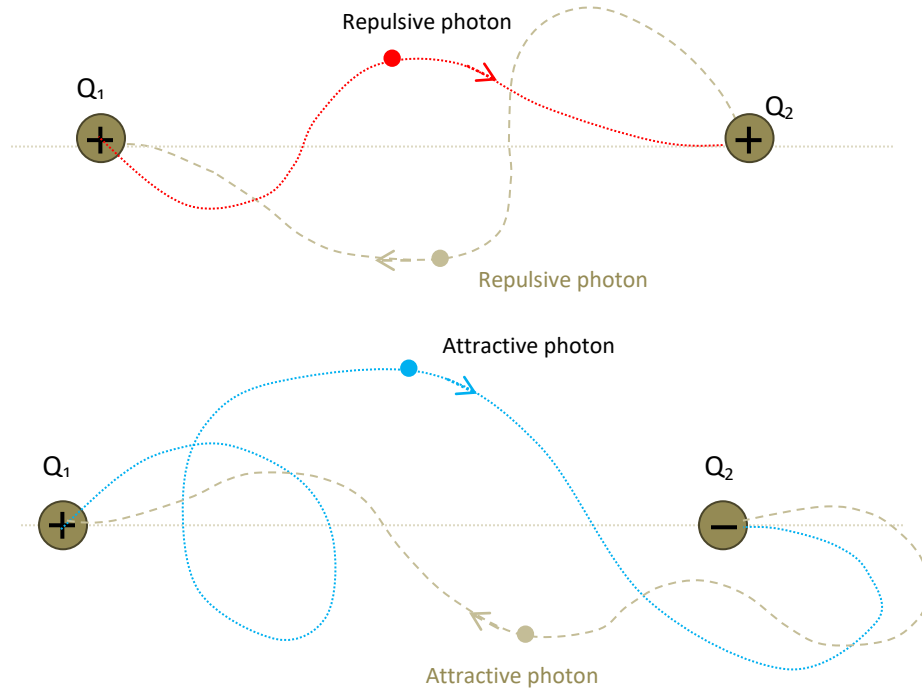


Fig. 2

Note there is still a wrong classical/conventional thinking in the above explanation. In classical and conventional physics, if a stationary particle A on the x -axis is hit by another particle B moving along the x -axis in the $+x$ direction, particle B also will always start moving in the x -axis. This is not the case at quantum level, according to the new theory.

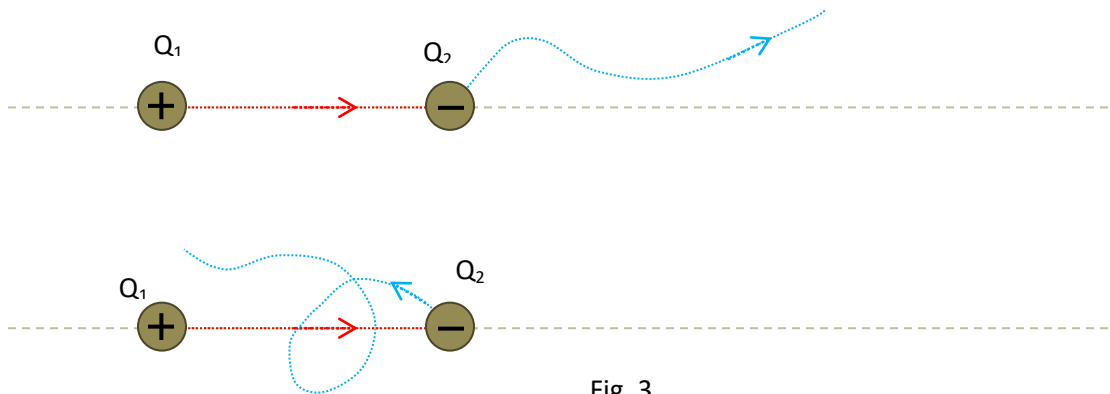


Fig. 3

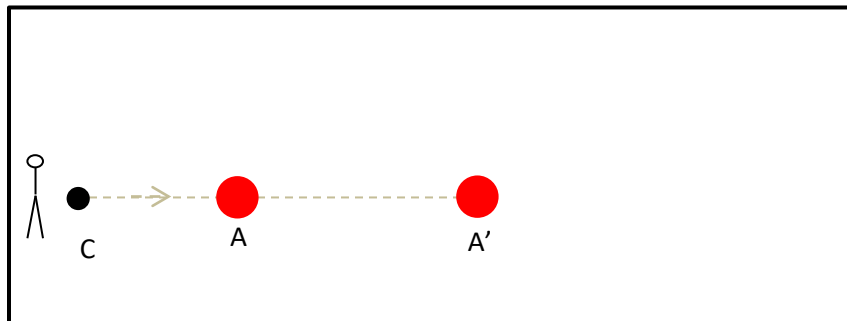
As shown in the second of the above figures, the charge Q_2 hit by Q_1 may even move towards Q_1 , not away from it as conventionally thought. Therefore, our description of the electrostatic attractive force shown in Fig.2 is only classical/conventional. That is, the photon from Q_1 need not hit Q_2 from behind as shown in Fig.2. According to the new theory, the direction of motion of Q_2 is determined only by its internal wave. The only requirement is that Q_2 is attracted (moved) towards Q_1 .

The mass of elementary particles

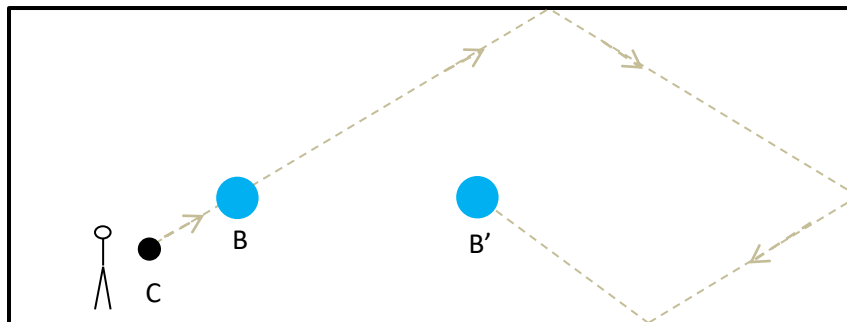
So far we have concerned ourselves with the charge of particles. Similar theory applies to the mass and other properties of particles. Elementary particles differ in their masses not necessarily because of any intrinsic differences between them but because of the *rules*. How can we explain the mass of elementary particles?

Mass could be explained by the internal dynamics of elementary particles, which is predetermined by the *internal* initial conditions of that particle. Just as we argued about the charge of particles, the mass of elementary particles is also due to the *rules*. The mass difference between an electron and a positron and a neutrino, for example, is not due to a difference in some intrinsic property of the particles, but due *a difference of the rules* applying to these particles.

Let us use a somewhat similar analogy to the one we used for our argument about charges. We have two *identical* balls A and B. A man uses another ball C to hit balls A and B, to move ball A from initial position A to position A', and to move ball B from initial position B to position B', as shown in the figure below. Distances AA' and BB' are equal.



(a)



(b)

Fig. 4

The man hits ball A in such a way that it moves *directly* from position A to position A', as shown in (a) above. However, in the case of ball B, he hits ball B towards the wall so that ball B moves from initial position B to final position B' after bouncing off the walls, as shown in (b) above. The speed (momentum) of ball C is the same in both cases.

We can see that although balls A and B have the same mass, ball A moves from position A to position A' in a much shorter time than ball B moves from position B to position B'. If we consider only the initial and final positions of the balls, the average velocity of ball B is much less than the average velocity of ball A; this is because ball B took longer time than ball A to cover the same distance (more precisely, *displacement*).

Therefore, roughly speaking, although the 'forces' applied to each ball were equal (the momentum of ball C was the same in both cases), ball B appeared to have greater mass than ball A ! (Note that we assumed that the observer considers only the initial and final positions of the balls. This could be a detector placed at the final position, which does not know about the actual path taken by ball B.

The man has a *rule*. Whenever he is to move ball A from any initial point A to any other point A', he hits ball A so that it goes directly from A to A'. However, whenever he is to move ball B the same distance, he works out a way so that ball B takes longer time than it takes ball A, the exact time. It is up to the man to figure out how to bounce ball B from the walls to get the exact time delay. The rule (the rule of mass) is always applied without exception. Therefore, although balls A and B are identical in every aspect (mass, shape, material, etc.) , the *mass rule* makes ball B always appear heavier than ball A.

The same applies to elementary particles. For example, the electron and the positron could be intrinsically identical, but they appear different only because of nature's *charge rule* and *mass rule*. As we shall see in this paper, elementary particles move in seemingly 'unpredictable' curved paths that are predetermined by initial conditions. Suppose that an electron and a positron are hit at the same time by particles having equal momentum (magnitude), and that there is a detector for each. A positron appears to have much greater mass than an electron because the path of the positron is much longer than that of the electron and the velocity of the positron along its path (elementary particles move with continuously changing velocity/speed along their path) is much less than that of the electron, so that the positron is detected much later than the electron for the same distance between source and detector. Nature has predetermined (by initial condition) that the path of the positron is much longer than that of the electron.

But we can also think of mass in other way. In the above explanation, the mass of a particle is due to its path length. But we can also visualize mass as being due to the velocity of the particle. In fact we can also think of mass as a combination of the two effects: path length and velocity. A photon can be incident on two identical particles which only differ in their internal waves. The velocity of a particle will depend on the internal wave of the particle which is a result of interaction of the initial wave and the photon. Therefore, a lighter particle is one in which its internal wave and the incident photon are such that the velocity of the particle will be higher after being hit by a photon. On the other hand, a heavier particle is one in which its internal wave and the incident photon are such that the resulting wave makes the particle move at a lower

velocity. This is the actual mystery behind ‘acceleration’. The photon /graviton is always fine-tuned according to the kind of particle it is aimed at.

The difference between two different elementary particles is just like the ‘difference’ between two identical ponds with different waves. The waves on each pond can be formed differently, for example, depending on where we drop a stone in each pond, or depending on the size and shape of the stones, or depending on the momentum of the stones, or depending on the number of stones we drop, etc. The waves on each pond at any time depend on the initial conditions (ideally, assuming no loss of energy, the waves will continue indefinitely by reflecting back and forth). The two ponds will never have the same waves because the *initial condition* of each is different.

Mysterious internal dynamics of elementary particles

We have stated that the charges and masses of elementary particles can be only due to the fixed *rules* of nature, not because of any intrinsic, fundamental difference between the particles. But what makes an electron emit a photon that always pushes another electron away? It is the internal dynamics of the electron itself. It is because of “coincidence”. In our everyday life, coincidences are extremely rare. But “coincidences” *always* happen in the most fundamental laws of nature, such as an electron *always* repelling another electron and *always* attracting a proton. But, as we will see later, these are not coincidences. It is the way the universe is programmed. By “programmed” I mean that the initial conditions of the *internal dynamics* (this is unknown to current physics) of every elementary particle in the universe has been set in such a way that the laws of nature are what they are. Considering the number of particles in the universe, this requires infinite intelligence, pointing to a supernatural intelligent being. We will clarify this further later.

Motion of elementary particles

We already stated that an electron is not a point particle but exists distributed in a finite region of space, with mass distribution. We used an analogy to describe this: an “electron pond”. Profoundly, this also means that whenever an electron is hit by another particle (by a photon or by a neutrino, for example), that particle does not actually “push” the electron as is conventionally thought. When the photon hits the electron, it starts an internal wave in the “electron pond” the same way a stone hitting a pond starts/creates water waves. Therefore, we don’t say that the photon (or the neutrino) pushes the electron, just like we don’t say that the stone ‘pushes’ the pond. The stone does not displace the pond as a whole; it only creates the water waves. The mystery of the internal dynamics of elementary particles is that the electron (hit by a photon) starts moving because of the internal waves started by the photon. This is a deep mystery of the universe at the quantum level because from everyday experience we know that water waves don’t displace the pond water as a whole. The waves only create periodic motion of water molecules about their initial positions. Material waves (such as water waves, sound waves, string waves, etc.) do not result in displacement of their material media as a whole. This theory applies to all elementary particles including electrons and photons.

The internal waves in a particle (electron, photon, etc.), which are continuously changing, at a given instant of time determine the instantaneous velocity (magnitude and direction) of the

electron at that instant of time[3]. In the figure below, as discussed above, we can see that the path (and instantaneous velocity along the path) is predetermined by the initial condition of the internal dynamics of the particle. The paths and instantaneous velocities of the two particles at any time are completely different. Note that although the path of a particle looks erratic or unpredictable, it is completely predetermined by its initial conditions. Newton's law that an object/particle continues to move with constant velocity in a straight line in the absence of a net force is only apparent and thus fundamentally wrong (well, both right and wrong) at the quantum level. However, this is fundamentally inaccessible to physical experiments to test.

The known speed of light (which is a constant), vacuum permittivity and permeability and many physical constants are only apparent or average values. For example, that light always travels in a straight line is only an apparent phenomenon. That the speed of light is constant (c) is also only an apparent/average phenomenon[3].

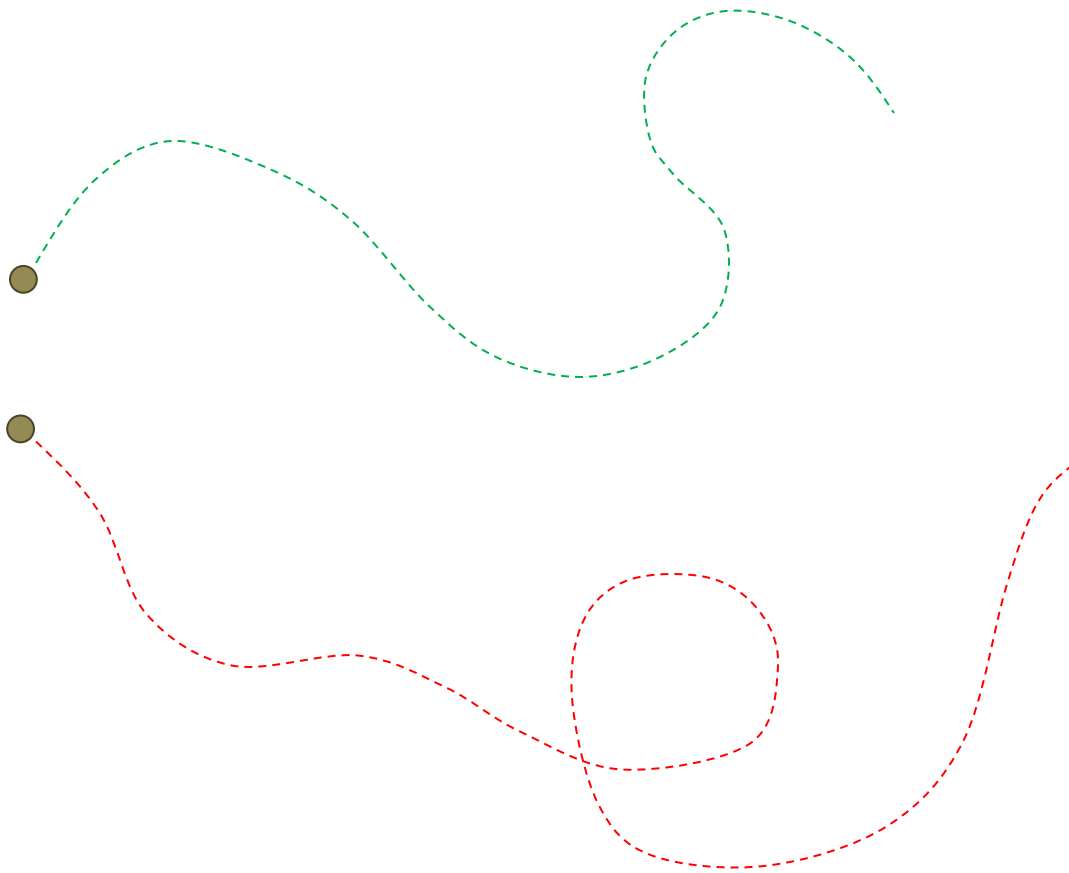


Fig. 5

Does every particle in the universe *actually* interact with every other particle in the universe by exchange of force particles?

It is universally believed that every object/particle in the universe *actually* interacts (electromagnetic or gravitational) with every other object/particle in the universe. Let us see how this is simply impossible. The estimated number of atoms in the observable universe is 10^{82} atoms. Therefore, the number of elementary particles in the universe is much greater. It is impossible for an electron to exchange 10^{82} photons per second (at least). But we know and accept that the laws of gravitation apply precisely enough, i.e. it is as if the electron actually interacted with every other particle in the universe. If a particle/an object cannot actually interact with every other particle/object in the universe, then how is it that the law of gravitation applies so well? (or we believe that it applies so well). The mystery is revealed as follows.

The gravitational force acting on our Earth, for example, is not necessarily caused by the “gravitons” from *every* object in the universe. But the *actual, measured* gravitational force on Earth is *as if* this was precisely the case. How can we solve this puzzle? The mystery is that the gravitons hitting the Earth can come only from a very small fraction of objects/particles in the universe. The gravitons emitted from those particles/objects towards the earth are so extremely *fine-tuned* that the gravitational force on Earth is exactly as if every object/particle in the universe actually exchanged gravitons with the Earth. This means that, for example, the Sun does not say: “ I don’t care about the gravitational force between Alpha Centaury and its planets”. If at any time the Sun happens to emit a graviton with precisely the right strength (frequency) at precisely the right time that could be needed to execute Newton’s law of gravitation between Alpha Centaury and one of its planets, that graviton could be sent from the Sun to Alpha Centaury or to its planet (Fig.6). The Sun sends a graviton towards a planet of Alpha Centauri *on behalf of* Alpha Centauri ! To the planet, the strength of the gravitational pull (both direction and strength) created by the graviton coming from the Sun is exactly as if that graviton came from Alpha Centauri. In the figure on next page, we can see that the tangent line to the graviton path (red curve) at the planet passes through Alpha Centauri, to pretend that the graviton came from Alpha Centauri. However, this is inaccessible to any physical experiment!!! (Note again that this view of the tangent line is still classical/conventional as we already discussed. According to the new quantum theory being proposed, the graviton could hit the planet from any direction, as shown by the blue path. The only requirement is that the planet is pulled toward Alpha Centauri). There is no physical experiment to determine that that particular graviton came from the Sun. Only God knows where that graviton came from. And this particular event (emission of a graviton by a particle in the Sun and the path and every instantaneous velocity of that graviton along its path) was predetermined when the initial condition of the particle in the Sun that emitted that graviton was set billions of years ago! The path of every particle is predetermined.

The law of gravitation (and other laws of nature) is executed *collectively* by all particles and objects in the universe. This is a deep mystery and I can’t fully explain everything in this paper. For example, photons and gravitons do not actually go in a straight line and this is explained in my other paper [3].

As another illustration, suppose that we have one trillion charged particles in a room. It is universally assumed that each particle exchanges force particles with every other particle in the

room, which is impossible as we have argued above. What actually happens is that a force particle (photon) hitting an electron at any instant of time could come from any other single particle, with that photon so *fine-tuned* that the force on the electron is *exactly* as if that electron exchanged photons with every other particle in the room, with the force exactly as predicted by Coulomb's law. This is made possible by the grand programming of the universe, i.e. the fine-tuning of the initial conditions of the internal dynamics of the particles, which have infinite internal degree of freedom. In other words, this is a scientific proof of God.

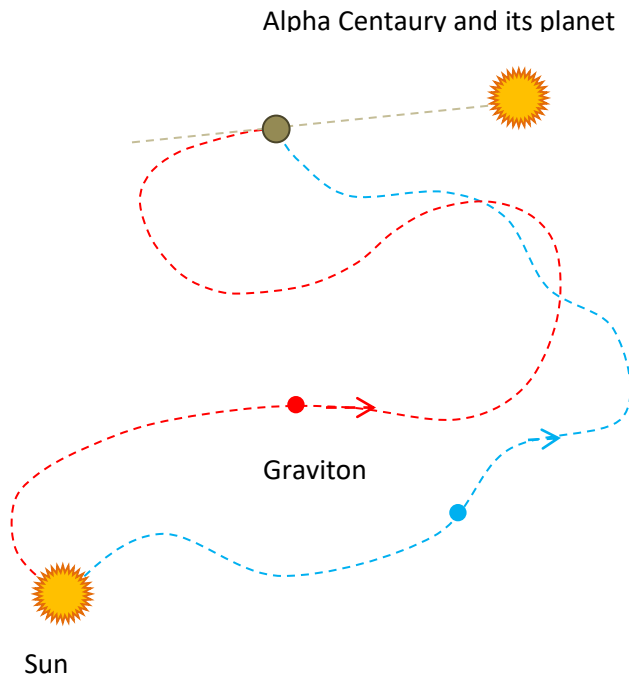


Fig. 6

What is gravity?

In my previous papers, I proposed that the gravitational force between two objects is a difference between electrostatic attractive and repulsive forces between the charged particles of two objects. However, according to the new theory being proposed in this paper, this does not necessarily mean that two photons (one attractive, one repulsive) must *actually* hit an object for a gravitational force to arise. What is actually happening is that an extremely weak photon ('graviton') hits the object, with its effect as if two photons (one attractive, one repulsive) hit the object. A 'graviton' is nothing but an extremely weak photon.

One may argue that why then it is impossible to shield gravitational field, unlike electrostatic field. This could be explained by gravitons being extremely weak photons, therefore extremely low frequency photons, unlike electrostatic photons which are much stronger, therefore much higher frequency photons.

Therefore, as stated above, it would be wrong to think that every object in the universe *actually* exchanges ‘gravitons’ with every other object in the universe. The graviton hitting a particle at any instant can come from any particle in the universe, and it is so extremely fine-tuned in such a way as if the particle interacted with every particle in the universe.

The speed of electrostatic fields and gravity

It is well known from observations and experiments that the speed of electrostatic and gravitational fields is infinite. But, on the other hand, this infinite speed view does not seem to have a mechanism and therefore not acceptable. Also some gravitational phenomena, such as Mercury perihelion advance, hint at a finite speed of gravity, equal to the speed of light (c). How can these contradictory ideas be reconciled? The mystery is solved as follows.

Suppose that the Sun disappeared instantly, at $t = 0$. Obviously, sunlight would disappear after about 8.3 minutes. What about the gravitational pull of the Sun on Earth? A novel solution is proposed as follows. The gravitational force of the Sun on Earth would disappear instantaneously as the Sun disappears. How can this be? Just 8.3 minutes before its disappearance (at $t = -8.3$ minutes), the Sun, having a “foreknowledge” (anticipating) that it would disappear after 8.3 minutes, sends a signal of zero gravitational field towards the Earth, which travels at the speed of light. The zero gravitational field arrives on Earth after 8.3 minutes, at $t = 0$. Thus, the disappearance of the Sun and the loss of gravitational force on Earth both occur at $t = 0$. It is as if the zero gravitational field travelled at infinite speed. Therefore, we can say that the speed of gravity has *dual* nature: infinite and finite (c).

But how can the Sun have a “foreknowledge” of its disappearance? The mystery is the grand initial programming (initial conditions) of the universe and the complex internal dynamics of elementary particles. By “coincidence” the particles of the Sun emit zero gravitational field towards the Earth at $t = -8.3$ minutes. But, as we already discussed, this is not like “coincidences” we know in our everyday life which occur extremely rarely. These are coincidences that always happen so that the laws of the universe are the way they are. This is a scientific proof of God.

Two kinds of photons: light photons vs. force carrier photons

A photon is emitted by an accelerating charge. However we make a distinction between two kinds of photons: ‘light’ photons and ‘force carrier’ photons. We are familiar with light photons in physics. However, the origin of force carrier photons, which we have already explained above, is unknown to physics.

The mystery of force carrier photons is this. Imagine two charged particles Q_1 and Q_2 with some distance apart. Suppose that at time $t = 0$, charge Q_1 is suddenly accelerated from its initial position to a new position. The question is: will the sudden acceleration and change in position of Q_1 be felt by Q_2 instantaneously or with the delay of the speed of light (c)? The answer is that Q_2 senses the change in position of Q_1 instantaneously as it occurs. How is this possible? Is it because the electrostatic field propagated at infinite speed? No. The mystery is solved as follows.

Charge Q_1 ‘anticipates’ its own acceleration and change in position before it actually occurs and emits corresponding photons, say at $t = -\tau$, where τ is the time delay due to finite speed (c) propagation of the force particles from Q_1 to Q_2 . Therefore, the ‘force carrier’ photons emitted at $t = -\tau$ are emitted for a phenomenon (acceleration of Q_1) that will occur after a delay of τ .

Nuclear forces

One of the really unsolved mysteries in physics is what holds the protons together in the nucleus, overcoming the tremendous repulsive forces between them. I have already proposed a new theory [2]. Briefly, the new theory says that protons don’t exist as separate small spheres in the nucleus, as conventionally thought. As quantum objects, each proton exists spread in the nucleus and therefore the protons exist ‘intermingled’ with each other in the nucleus. It can be seen that, although the protons always repel each other, they don’t fly apart because they are intermingled. An analogy for this would be two boxers very close to each other and tangled up. They can’t throw punches at each other because they are too close to each other.

The question then is: how were the protons brought close together into the nucleus in the first place, considering the tremendous electrostatic repulsion between them? The new theory explains this as follows. The initial conditions of the internal dynamics of the protons were fine tuned in such a way that they did not repel each other, and in fact they attracted each other, before the formation/creation of the nucleus. Once the nucleus was formed, the internal waves of each proton changed so that protons always repel protons. In other words, protons attracted each other during creation/formation of the universe. All of this is not arbitrary, but is a result of the initial fine-tuning of the internal dynamics of the protons.

Why are the laws and phenomena of the universe what they are?

Why is the mass of the electron what it is? Why is the speed of light what it is? Why are Newton’s law of gravitation and Coulomb’s law what they are? Why are Newton’s laws of motion what they are? Why are the phenomena and laws of quantum mechanics (‘wave function collapse’, quantum entanglement, Which-Way quantum experiment) what they are?

The mystery underlying the laws of nature is this: *the extreme fine-tuning of the initial conditions of the internal dynamics of each and every elementary particle in the universe at some point in the past. The difference between elementary particles is only due to the **rules**, which are predetermined by the initial fine tuning of the internal dynamics of elementary particles.*

‘Coincidences’

That an electron always repels another electron and always attracts a proton is only ‘coincidences’, i.e. we don’t need to search further for some deeper mechanism that could explain how an electron ‘recognizes’ another particle to be a proton or an electron, so that it would ‘decide’ to emit photons in such a way as to attract the proton and repel the electron. Imagine that we could see an electron and how it emits photons (force carriers) in the lab. We bring a proton near that electron and see that the electron emits the photons in such a way that

the proton is pushed towards the electron. We repeat this experiment many times and find that the electron always attracts the proton. But why does the electron emit photons in such a way that it always attracts the proton? The answer would be: because the internal dynamics of the electron always *happens* to emit photons in such a way that a proton is attracted towards the electron. Continuing our quest, why is the internal dynamics of the electron this way? Because of its initial tuning and perhaps because the electron itself had been hit by another photon to change its internal dynamics in such way. What made that photon so fine-tuned for this? Perhaps that photon was emitted by another electron that was so fine tuned to emit the right photon, and so on. Every quantum phenomena is so fine tuned to cause another phenomena in such a way that the laws of the universe are what they are, as if the right quantum phenomena always happens by perfect ‘coincidences’. But these are designed and predetermined, and are not coincidences.

Predetermination? Free will?

The above theory suggests that everything in the universe is predetermined, in the same way that the point on the ground where a ball kicked into the air lands is predetermined at the instant the ball is kicked, when the initial conditions (speed, direction, spin etc.) are determined/set.

The initial conditions of the internal dynamics of every particle in the universe was set at some point in the past and *everything* happening in the universe, including on our Earth, is predetermined. A boy throwing a ball into the air, a woman driving a car, a rain droplet falling on the roof, an ancient man throwing a spear at a gazelle, a lion chasing a zebra, a building standing somewhere, a physicist doing an experiment in a lab, the motion of each and every particle in the plasma of the Sun, an asteroid falling on Earth, and so on, all these occur because they were predetermined.

Does this mean that there is no free will? No. When I throw a stone into a pond, the decision to throw the stone is because of my own free will, but the motion of my hand, the projectile motion of the stone in the air, and its hitting the water, the water waves (motion of every water particle) is predetermined. In other words, our free will determines *retroactively* what was to be predetermined.

One might argue that the decision itself, which could be explained in terms of the motions and reactions of particles in our brains, will be predetermined according to this argument. I believe that the decision is made in another “dimension” which is immaterial and not subject to predetermination.

Intervention of God in the universe

When I say God intervenes in the operation of the universe [1], this should be interpreted as follows: the intervention of God is mainly by setting the initial conditions of the internal dynamics of every particle in the universe. Therefore, God has already intervened in the operation of the universe when He set the initial conditions of the internal dynamics of each and every elementary particle in the universe, during creation.

Therefore, God may not necessarily intervene in the operation of the universe arbitrarily on everyday basis. For example, the stopping of the Sun in the sky by Joshua (a story in the Bible) , which is usually ridiculed by physicists, was something that was planned (predetermined) at the beginning of the universe.

Discussion

In principle, if we fully understood this mysterious internal dynamics of elementary particles and if we knew the current instantaneous state (initial conditions) of every elementary particle in the universe (electrons, positrons, neutrinos, photons, gravitons, . . .) we would be able to know everything about the future and everything about the past (who will be the next president of some country, when someone was born and when, where and how they will die, when and how a particular car will break down, etc.). The analogy to this is that if we know the state of the waves in a pond (initial conditions), we can completely describe the wave at any future time. Of course, perhaps we would need a supercomputer many times the size of the universe itself for this. But it would be impossible to measure and know the internal state of even a single electron (also consider its almost infinite internal degrees of freedom). It is even inconceivable how to measure the internal state of a graviton flying at the speed of light [4].

At the most fundamental level (which is the quantum level) , a car moves not because of the driver stepping on the gas pedal but because every elementary particle making up the car was fine tuned to move together when the car moves and stop together when the car stops. One can imagine that perhaps the internal dynamics of the elementary particles themselves may not be enough for the arbitrary motion of a car. Therefore, gravitons and photons with the right fine tuning from the universe could continuously shower the car to always keep the atoms and elementary particles of the car together. Some of the gravitons could originate from the Earth, some from the Sun, some from stars and galaxies light years away and some from the car itself.

To appreciate the profound implication of this, imagine trying to stop the waves on a pond. It would require starting other waves, to interfere with existing wave, at the right time and at the right point in the pond and in the right way (if this is possible at all). Keeping elementary particles together in a moving car requires controlling the internal waves of each elementary particle.

To say that the universe is like a steel ball sitting on the tip of a needle (the slightest push could tip its balance) would be vastly an understatement.

Each and every elementary particle in the universe (electrons, positrons, photons, gravitons, ...) is so extremely fine- tuned as not to tip the extremely delicate balance of the universe. Each and every photon and graviton flying around in the universe is aimed for a particular elementary particle or atom. In fact, a single wrongly tuned elementary particle or a single photon hitting the wrong particle, could end the universe as we know it, in a chain reaction. *There is nothing random in the universe.* A single wrongly tuned electron, for example, would emit wrongly tuned gravitons or photons, which would hit other elementary particles, disturbing their right fine tuning, which would in turn start emitting wrong photons and gravitons, and so on. All the laws

and phenomena of nature including Newton's laws of motion and gravitation, Coulomb's electrostatics law, quantum phenomena, Planck's constant, the elementary charge, and the physical constants including the speed of light, vacuum permittivity and permeability, atoms, molecules, nuclei would be destroyed/collapse. All macroscopic objects (galaxies, stars, planets, cars, buildings, people, etc.) would dissolve into elementary particles (not to continue inquiry further into elementary particles themselves).

Therefore, if the universe will end at some time in the future, then we can imagine that the 'wrong' photons and gravitons are already on their way to the billions of stars and galaxies, perhaps one photon/graviton for each star. Therefore, the end of the universe will not be due to gravitational collapse (which is what conventional physics says and is based on classical view), but due to quantum phenomena.

The very existence of the universe as we know it, despite such infinitely delicate balance of its existence, is by itself an overwhelming scientific evidence of God.

On the other hand, the universe, by its very nature (according to the new theory in this paper), may not have existed and may not exist forever. Fundamentally, this is related to the fact that the degree of freedom of the universe, which is related to the number of elementary particles in the universe, is finite, and not infinite. Or is it (almost) infinite, with each elementary particle having infinite or almost infinite internal degree of freedom?

Conclusion

This paper has revealed the deepest mystery of the universe. We have seen that all matter in the universe is made up of elementary particles (known to physics) that are to be seen not as point particles but each as small "particle ponds", analogous to a water pond. The waves in these "particle ponds", analogous to water waves in a pond, give rise to all physical laws and phenomena in the universe. This internal structure and dynamics of elementary particles (unknown to physics, and to be explored yet), with their (almost) infinite internal degrees of freedom and perfect initial fine-tuning, could explain the mass and charge of elementary particles, the physical constants, why the laws of nature are the way they are, the existence of nuclei, atoms, molecules, planets, stars, galaxies, and even everyday occurrences in our lives. Even so, it is a miracle that all elementary particles could be coordinated to create the neat order we see in the universe, from the nuclear and atomic level to the galactic level. We have seen that all the four known forces in the universe (electromagnetic, gravitational, the strong and the weak nuclear forces) are just manifestations of the electromagnetic force. We have seen that the universe exists as we know it because of perfect coordination of all elementary particles in the universe, which is an overwhelming scientific evidence of God.

Thanks to Almighty God Jesus Christ and His Mother Our Lady Saint Virgin Mary

Notes and references

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4. Actually, gravitons and photons travel with a continuously changing instantaneous velocity along their path, ranging from subluminal to superluminal, in curved paths. That the speed of photons is constant c and that light travels in a straight line is only an average or apparent phenomena.