

Deep Space Atomic Clock

In deep space, accurate timekeeping is vital to navigation, but many spacecraft lack precise timepieces on board. [5]

Physics is sometimes closer to philosophy when it comes to understanding the universe. Donald Chang from Hong Kong University of Science and Technology, China, attempts to elucidate whether the universe has a resting frame. [4]

This paper explains the Special and General Relativity from the observed effects of the accelerating electrons, causing naturally the experienced changes of the electric field potential along the moving electric charges. The accelerating electrons explain not only the Maxwell Equations and the Special Relativity, but the Heisenberg Uncertainty Relation, the wave particle duality and the electron's spin also, building the bridge between the Classical and Relativistic Quantum Theories.

The changing acceleration of the electrons explains the created negative electric field of the magnetic induction, the electromagnetic inertia, the changing relativistic mass and the Gravitational Force, giving a Unified Theory of the physical forces. Taking into account the Planck Distribution Law of the electromagnetic oscillators also, we can explain the electron/proton mass ratio and the Weak and Strong Interactions.

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Preface

Surprisingly nobody found strange that by theory the electrons are moving with a constant velocity in the stationary electric current, although there is an accelerating force $\underline{F} = q \underline{E}$, imposed by the \underline{E} electric field along the wire as a result of the \underline{U} potential difference. The accelerated electrons are creating a charge density distribution and maintaining the potential change along the wire. This charge distribution also creates a radial electrostatic field around the wire decreasing along the wire. The moving external electrons in this electrostatic field are experiencing a changing electrostatic field causing exactly the magnetic effect, repelling when moving against the direction of the current and attracting when moving in the direction of the current. This way the \underline{A} magnetic potential is based on the real charge distribution of the electrons caused by their acceleration, maintaining the \underline{E} electric field and the \underline{A} magnetic potential at the same time.

The mysterious property of the matter that the electric potential difference is self maintained by the accelerating electrons in the electric current gives a clear explanation to the basic sentence of the relativity that is the velocity of the light is the maximum velocity of the electromagnetic matter. If the charge could move faster than the electromagnetic field, this self maintaining electromagnetic property of the electric current would be failed.

More importantly the accelerating electrons can explain the magnetic induction also. The changing acceleration of the electrons will create a $-\underline{E}$ electric field by changing the charge distribution, increasing acceleration lowering the charge density and decreasing acceleration causing an increasing charge density.

Since the magnetic induction creates a negative electric field as a result of the changing acceleration, it works as an electromagnetic inertia, causing an electromagnetic mass. If the mass is electromagnetic, then the gravitation is also electromagnetic effect caused by the accelerating Universe! The same charges would attract each other if they are moving parallel by the magnetic effect.

NASA tests atomic clock for deep space navigation

In deep space, accurate timekeeping is vital to navigation, but many spacecraft lack precise timepieces on board. For 20 years, NASA's Jet Propulsion Laboratory in Pasadena, California, has been perfecting a clock. It's not a wristwatch; not something you could buy at a store. It's the Deep Space Atomic Clock (DSAC), an instrument perfect for deep space exploration.

Currently, most missions rely on ground-based antennas paired with atomic clocks for navigation. Ground antennas send narrowly focused signals to spacecraft, which, in turn, return the signal. NASA uses the difference in time between sending a signal and receiving a response to calculate the spacecraft's location, velocity and path.

This method, though reliable, could be made much more efficient. For example, a ground station must wait for the spacecraft to return a signal, so a station can only track one spacecraft at a time. This requires spacecraft to wait for navigation commands from Earth rather than making those decisions on board and in real-time.

"Navigating in deep space requires measuring vast distances using our knowledge of how radio signals propagate in space," said Todd Ely of JPL, DSAC's principal investigator. "Navigating routinely requires distance measurements accurate to a meter or better. Since radio signals travel at the speed of light, that means we need to measure their time-of-flight to a precision of a few nanoseconds. Atomic clocks have done this routinely on the ground for decades. Doing this in space is what DSAC is all about."

The DSAC project aims to provide accurate onboard timekeeping for future NASA missions. Spacecraft using this new technology would no longer have to rely on two-way tracking. A

spacecraft could use a signal sent from Earth to calculate position without returning the signal and waiting for commands from the ground, a process that can take hours. Timely location data and onboard control allow for more efficient operations, more precise maneuvering and adjustments to unexpected situations.

This paradigm shift enables [spacecraft](#) to focus on mission objectives rather than adjusting their position to point antennas earthward to close a link for two-way tracking.

Additionally, this innovation would allow ground stations to track multiple satellites at once near crowded areas like Mars. In certain scenarios, the accuracy of that tracking data would exceed traditional methods by a factor of five.

DSAC is an advanced prototype of a small, low-mass atomic clock based on mercury-ion trap technology. The atomic clocks at ground stations in NASA's Deep Space Network are about the size of a small refrigerator. DSAC is about the size of a four-slice toaster, and could be further miniaturized for future missions.

The DSAC test flight will take this technology from the laboratory to the space environment. While in orbit, the DSAC mission will use the navigation signals from U.S. GPS coupled with precise knowledge of GPS satellite orbits and clocks to confirm DSAC's performance. The demonstration should confirm that DSAC can maintain time accuracy to better than two nanoseconds (.000000002 seconds) over a day, with a goal of achieving 0.3 nanosecond accuracy.

Once DSAC has proved its mettle, future missions can use its technology enhancements. The clock promises increased tracking data quantity and improved tracking data quality. Coupling DSAC with onboard radio navigation could ensure that future exploration missions have the navigation data needed to traverse the solar system.

Technologies aboard DSAC could also improve GPS clock stability and, in turn, the service GPS provides to users worldwide. Ground-based test results have shown DSAC to be upwards of 50 times more stable than the [atomic clocks](#) currently flown on GPS. DSAC promises to be the most stable navigation space [clock](#) ever flown.

"We have lofty goals for improving deep space [navigation](#) and science using DSAC," said Ely. "It could have a real and immediate impact for everyone here on Earth if it's used to ensure the availability and continued performance of the GPS system." [5]

Does the universe have a rest frame?

Physics is sometimes closer to philosophy when it comes to understanding the universe. Donald Chang from Hong Kong University of Science and Technology, China, attempts to elucidate whether the universe has a resting frame. The results have recently been published in EPJ Plus.

To answer this tricky question, he has developed an experiment to precisely evaluate particle mass. This is designed to test the special theory of relativity that assumes the absence of a rest frame, otherwise it would be possible to determine which inertial frame is stationary and which frame is moving. This assumption, however, appears to diverge from the standard model of cosmology, which assumes that what we see as a vacuum is not an empty space. The assumption is that the energy of our universe comes from the quantum fluctuation in the vacuum.

In a famous experiment conducted by Michelson and Morley in the late 19th century, the propagation of light was proved to be independent of the movement of the laboratory system. Einstein, his Special Theory of Relativity, inferred that the physical laws governing the propagation of light are equivalent in all inertial frames—this was later extended to all physics laws not just optics.

In this study, the author set out to precisely measure the masses of two charged particles moving in opposite directions. The conventional thinking assumes that the inertial frame applies equally to both particles. If that's the case, no detectable mass difference between these two particles is likely to arise. However, if the contrary is true, and there is a rest frame in the universe, the author expects to see mass difference that is dependent on the orientation of the laboratory frame.

This proposed experiment partially inspired by the Michelson and Morley experiments can be conducted using existing experimental techniques. For simplicity, an electron can be used as the charged particle in the experiment. [4]

Simple Experiment

Everybody can repeat my physics teacher's - Nándor Toth - middle school experiment, placing aluminum folios in form V upside down on the electric wire with static electric current, and seeing them open up measuring the electric potential created by the charge distribution, caused by the acceleration of the electrons.

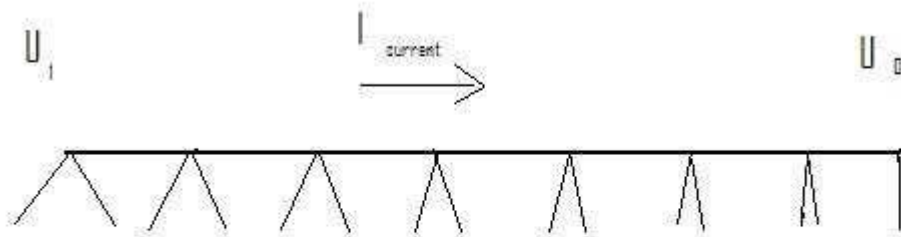


Figure 1.) Aluminium folios shows the charge distribution on the electric wire

He wanted to show us that the potential decreasing linearly along the wire and told us that in the beginning of the wire it is lowering harder, but after that the change is quit linear.

You will see that the folios will draw a parabolic curve showing the charge distribution along the wire, since the way of the accelerated electrons in the wire is proportional with the square of time. The free external charges are moving along the wire, will experience this charge distribution caused electrostatic force and repelled if moving against the direction of the electric current and attracted in the same direction – the magnetic effect of the electric current.

Uniformly accelerated electrons of the steady current

In the steady current $I = dq/dt$, the q electric charge crossing the electric wire at any place in the same time is constant. This does not require that the electrons should move with a constant v velocity and does not exclude the possibility that under the constant electric force created by the $E = -dU/dx$ potential changes the electrons could accelerating.

If the electrons accelerating under the influence of the electric force, then they would arrive to the $x = 1/2 at^2$ in the wire. The $dx/dt = at$, means that every second the accelerating q charge will take a linearly growing length of the wire. For simplicity if $a=2$ then the electrons would found in the wire at $x = 1, 4, 9, 16, 25 \dots$, which means that the dx between them should be 3, 5, 7, 9 ..., linearly increasing the volume containing the same q electric charge. It means that the density of the electric charge decreasing linearly and as the consequence of this the U field is decreasing linearly as expected: $-dU/dx = E = \text{const}$.

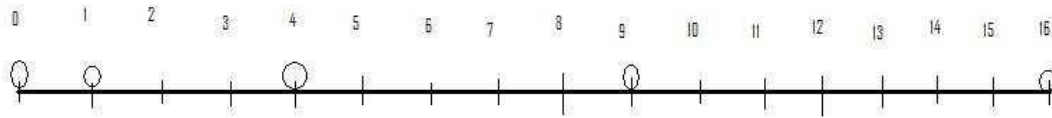


Figure 2.) The accelerating electrons created charge distribution on the electric wire

This picture remembers the Galileo's Slope of the accelerating ball, showed us by the same teacher in the middle school, some lectures before. I want to thank him for his enthusiastic and impressive lectures, giving me the associating idea between the Galileo's Slope and the accelerating charges of the electric current.

We can conclude that the electrons are accelerated by the electric U potential, and with this accelerated motion they are maintaining the linear potential decreasing of the U potential along they movement. Important to mention, that the linearly decreasing charge density measured in the referential frame of the moving electrons. Along the wire in its referential frame the charge density lowering parabolic, since the charges takes way proportional with the square of time.

The decreasing U potential is measurable, simply by measuring it at any place along the wire. One of the simple visualizations is the aluminum foils placed on the wire opening differently depending on the local charge density. The static electricity is changing by parabolic potential giving the equipotential lines for the external moving electrons in the surrounding of the wire.

Magnetic effect of the decreasing U electric potential

One q electric charge moving parallel along the wire outside of it with velocity v would experience a changing U electric potential along the wire. If it experiencing an emerging potential, it will repel the charge, in case of decreasing U potential it will move closer to the wire. This radial electric field will move the external electric charge on the parabolic curve, on

the equipotential line of the accelerated charges of the electric current. This is exactly the magnetic effect of the electric current. A constant force, perpendicular to the direction of the movement of the matter will change its direction to a parabolic curve.

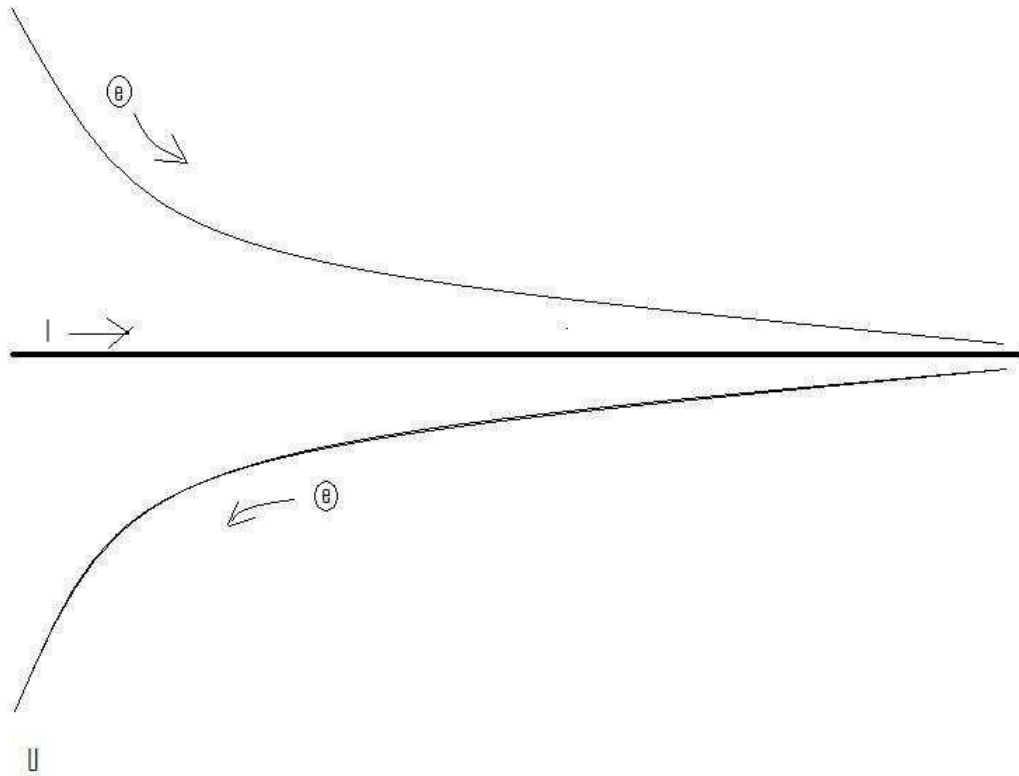


Figure 3.) Concentric parabolic equipotential surfaces around the electric wire causes the magnetic effect on the external moving charges

Considering that the magnetic effect is $\underline{F} = q \underline{v} \times \underline{B}$, where the \underline{B} is concentric circle around the electric wire, it is an equipotential circle of the accelerating electrons caused charge distribution. Moving on this circle there is no electric and magnetic effect for the external charges, since $\underline{v} \times \underline{B} = \underline{0}$. Moving in the direction of the current the electric charges crosses the biggest potential change, while in any other direction – depending on the angle between the current and velocity of the external charge there is a modest electric potential difference, giving exactly the same force as the $\underline{v} \times \underline{B}$ magnetic force.

Getting the magnetic force from the $\underline{F} = d\underline{p}/dt$ equation we will understand the magnetic field velocity dependency. Finding the appropriate trajectory of the moving charges we need simply

get it from the equipotential lines on the equipotential surfaces, caused by the accelerating charges of the electric current. We can prove that the velocity dependent force causes to move the charges on the equipotential surfaces, since the force due to the potential difference according to the velocity angle – changing only the direction, but not the value of the charge's velocity.

Moving on the parabolic equipotential line gives the same result as the constant force of gravitation moves on a parabolic line with a constant velocity moving body.

Necessary to mention that the \underline{A} magnetic vector potential is proportional with \underline{a} , the acceleration of the charges in the electric current. Also the \underline{A} magnetic vector potential gives the radial parabolic electric potential change of the charge distribution due to the acceleration of electric charges in the electric current.

Magnetic induction

Increasing the electric current I causes increasing magnetic field \underline{B} by increasing the acceleration of the electrons in the wire. If the acceleration of electrons is growing, than the charge density dQ/dl will decrease in time, creating a $-\underline{E}$ electric field. Since the resistance of the wire is constant, only increasing U electric potential could cause an increasing electric current $I=U/R=dQ/dt$.

Necessary to mention that decreasing electric current will decrease the acceleration of the electrons, causing increased charge density and \underline{E} positive field.

The electric field is a result of the geometric change of the \underline{U} potential and the timely change of the \underline{A} magnetic potential:

$$\underline{E} = -d\underline{A}/dt - dU/dr$$

$$\underline{B} = \nabla \times \underline{A}, \quad \underline{E} = -\nabla\phi - \frac{\partial \underline{A}}{\partial t},$$

The acceleration of the electric charges proportional with the \underline{A} magnetic vector potential in the electric current and also their time dependence are proportional as well. Since the \underline{A} vector potential is appears in the equation, the proportional \underline{a} acceleration will satisfy the same equation.

Since increasing acceleration of charges in the increasing electric current the result of increasing potential difference, creating a decreasing potential difference, the electric and magnetic vector potential are changes by the next wave - function equations:

$$\frac{1}{c^2} \frac{\partial^2 \varphi}{\partial t^2} - \nabla^2 \varphi = \frac{\rho}{\epsilon_0}$$

$$\nabla^2 \underline{A} - \frac{1}{c^2} \frac{\partial^2 \underline{A}}{\partial t^2} = -\mu_0 \underline{J}$$

The simple experiment with periodical changing \underline{U} potential and I electric current will move the aluminium folios with a moving wave along the wire.

The Lorentz gauge says exactly that the accelerating charges are self maintain their accelerator fields and the divergence (source) of the A vector potential is the timely change of the electric potential.

$$\nabla \cdot \vec{A} + \frac{1}{c^2} \frac{\partial \varphi}{\partial t} = 0.$$

Or

$$\vec{E} = -\nabla \varphi - \frac{\partial \vec{A}}{\partial t}.$$

The timely change of the A vector potential or the changing acceleration of the charges will produce a negative electric field.

Lorentz transformation of the Special Relativity

In the referential frame of the accelerating electrons the charge density lowering linearly because of the linearly growing way they takes every next time period. From the referential frame of the wire there is a parabolic charge density lowering.

The difference between these two referential frames, namely the referential frame of the wire and the referential frame of the moving electrons gives the relativistic effect. Important to say that the moving electrons presenting the time coordinate, since the electrons are taking linearly increasing way every next time period, and the wire presenting the geometric coordinate. The Lorentz transformations are based on moving light sources of the Michelson - Morley experiment giving a practical method to transform time and geometric coordinates without explaining the source of this mystery.

The real mystery is that the accelerating charges are maintaining the accelerating force with their charge distribution locally. The resolution of this mystery that the charges are simply the results of the diffraction patterns, that is the charges and the electric field are two sides of the same thing. Otherwise the charges could exceed the velocity of the electromagnetic field.

The increasing mass of the electric charges the result of the increasing inductive electric force acting against the accelerating force. The decreasing mass of the decreasing acceleration is the result of the inductive electric force acting against the decreasing force. This is the relativistic

mass change explanation, especially importantly explaining the mass reduction in case of velocity decrease.

The Classical Relativistic effect

The moving charges are self maintain the electromagnetic field locally, causing their movement and this is the result of their acceleration under the force of this field.

In the classical physics the charges will distributed along the electric current so that the electric potential lowering along the current, by linearly increasing the way they take every next time period because this accelerated motion.

The ether problem resolution is the matter as diffraction patterns of the electromagnetic oscillations. Also the accelerating charges (matter) maintaining the accelerating force with linearly changing potential is the secret of the relativity. Because of this the Michelson-Morley experiment doesn't show an existence of the ether, the electromagnetic oscillations always creates diffraction patterns, electrodynamics' matter, functioning as the ether. [1]

The Relativistic Quantum Mechanics

The same thing happens on the atomic scale giving a dp impulse difference and a dx way difference between the different part of the not point like particles.

Commonly accepted idea that the relativistic effect on the particle physics it is the fermions' spin - another unresolved problem in the classical concepts. If the electric charges can move only with accelerated motions in the self maintaining electromagnetic field, once upon a time they would reach the velocity of the electromagnetic field. The resolution of this problem is the spinning particle, constantly accelerating and not reaching the velocity of light because the acceleration is radial.

Heisenberg Uncertainty Relation

In the atomic scale the Heisenberg uncertainty relation gives the same result, since the moving electron in the atom accelerating in the electric field of the proton, causing a charge distribution on Δx position difference and with a Δp momentum difference such a way that they product is about the half Planck reduced constant. For the proton this Δx much less in the nucleon, than in the orbit of the electron in the atom, the Δp is much higher because of the greater proton mass.

This means that the electron and proton are not point like particles, but has a real charge distribution.

Wave – Particle Duality

The accelerating electrons explains the wave – particle duality of the electrons and photons, since the elementary charges are distributed on Δx position with Δp impulse and creating a wave packet of the electron. The photon gives the electromagnetic particle of the mediating force of the electrons electromagnetic field with the same distribution of wavelengths.

Atomic model

The constantly accelerating electron in the Hydrogen atom is moving on the equipotential line of the proton and its kinetic and potential energy will be constant. Its energy will change only when it is changing its way to another equipotential line with another value of potential energy or getting free with enough kinetic energy. This means that the Rutherford-Bohr atomic model is right and only that changing acceleration of the electric charge causes radiation, not the steady acceleration. The steady acceleration of the charges only creates a centric parabolic steady electric field around the charge, the magnetic field. This gives the magnetic moment of the atoms, summing up the proton and electron magnetic moments caused by their circular motions and spins.

Electromagnetic inertia and Gravitational attraction

Since the magnetic induction creates a negative electric field as a result of the changing acceleration, it works as an electromagnetic inertia, causing an electromagnetic mass.

It looks clear that the growing acceleration results the relativistic growing mass - limited also with the velocity of the electromagnetic wave.

Since $E = h\nu$ and $E = mc^2$, $m = h\nu / c^2$ that is the m depends only on the ν frequency. It means that the mass of the proton and electron are electromagnetic and the result of the electromagnetic induction, caused by the changing acceleration of the spinning and moving charge! It could be that the m_0 inertial mass is the result of the spin, since this is the only accelerating motion of the electric charge. Since the accelerating motion has different frequency for the electron in the atom and the proton, they masses are different, also as the wavelengths on both sides of the diffraction pattern, giving equal intensity of radiation.

If the mass is electromagnetic, then the gravitation is also electromagnetic effect caused by the accelerating Universe! The same charges would attract each other if they are moving parallel by the magnetic effect.

The Planck distribution law explains the different frequencies of the proton and electron, giving equal intensity to different lambda wavelengths! Also since the particles are diffraction patterns they have some closeness to each other – can be seen as a gravitational force.

Electromagnetic inertia and mass

Electromagnetic Induction

Since the magnetic induction creates a negative electric field as a result of the changing acceleration, it works as an electromagnetic inertia, causing an electromagnetic mass. [1]

Relativistic change of mass

The increasing mass of the electric charges the result of the increasing inductive electric force acting against the accelerating force. The decreasing mass of the decreasing acceleration is the

result of the inductive electric force acting against the decreasing force. This is the relativistic mass change explanation, especially importantly explaining the mass reduction in case of velocity decrease.

The frequency dependence of mass

Since $E = h\nu$ and $E = mc^2$, $m = h\nu / c^2$ that is the m depends only on the ν frequency. It means that the mass of the proton and electron are electromagnetic and the result of the electromagnetic induction, caused by the changing acceleration of the spinning and moving charge! It could be that the m_0 inertial mass is the result of the spin, since this is the only accelerating motion of the electric charge. Since the accelerating motion has different frequency for the electron in the atom and the proton, they masses are different, also as the wavelengths on both sides of the diffraction pattern, giving equal intensity of radiation.

Electron – Proton mass rate

The Planck distribution law explains the different frequencies of the proton and electron, giving equal intensity to different lambda wavelengths! Also since the particles are diffraction patterns they have some closeness to each other – can be seen as a gravitational force. [1]

There is an asymmetry between the mass of the electric charges, for example proton and electron, can understood by the asymmetrical Planck Distribution Law. This temperature dependent energy distribution is asymmetric around the maximum intensity, where the annihilation of matter and antimatter is a high probability event. The asymmetric sides are creating different frequencies of electromagnetic radiations being in the same intensity level and compensating each other. One of these compensating ratios is the electron – proton mass ratio. The lower energy side has no compensating intensity level, it is the dark energy and the corresponding matter is the dark matter.

Higgs mechanism

The magnetic induction creates a negative electric field, causing an electromagnetic inertia. Probably it is the mysterious Higgs field giving mass to the charged particles? We can think about the photon as an electron-positron pair, they have mass. The neutral particles are built from negative and positive charges, for example the neutron, decaying to proton and electron. The wave – particle duality makes sure that the particles are oscillating and creating magnetic induction as an inertial mass, explaining also the relativistic mass change. Higher frequency creates stronger magnetic induction, smaller frequency results lesser magnetic induction. It seems to me that the magnetic induction is the secret of the Higgs field.

In particle physics, the Higgs mechanism is a kind of mass generation mechanism, a process that gives mass to elementary particles. According to this theory, particles gain mass by interacting with the Higgs field that permeates all space. More precisely, the Higgs mechanism endows gauge bosons in a gauge theory with mass through absorption of Nambu–Goldstone bosons arising in spontaneous symmetry breaking.

The simplest implementation of the mechanism adds an extra Higgs field to the gauge theory. The spontaneous symmetry breaking of the underlying local symmetry triggers conversion of components of this Higgs field to Goldstone bosons which interact with (at least some of) the other fields in the theory, so as to produce mass terms for (at least some of) the gauge bosons. This mechanism may also leave behind elementary scalar (spin-0) particles, known as Higgs bosons.

In the Standard Model, the phrase "Higgs mechanism" refers specifically to the generation of masses for the W^\pm , and Z weak gauge bosons through electroweak symmetry breaking. The Large Hadron Collider at CERN announced results consistent with the Higgs particle on July 4, 2012 but stressed that further testing is needed to confirm the Standard Model.

Fermions' spin

The moving charges are accelerating, since only this way can self maintain the electric field causing their acceleration. The electric charge is not point like! This constant acceleration possible if there is a rotating movement changing the direction of the velocity. This way it can accelerate forever without increasing the absolute value of the velocity in the dimension of the time and not reaching the velocity of the light.

The Heisenberg uncertainty relation says that the minimum uncertainty is the value of the spin: $\frac{1}{2} \hbar = \mathbf{dx} \mathbf{dp}$ or $\frac{1}{2} \hbar = \mathbf{dt} \mathbf{dE}$, that is the value of the basic energy status, consequently related to the m_0 inertial mass of the fermions. The source of the mass is the changing acceleration of the charge, in the case of the spin the absolute value of the acceleration is constant, but the direction is constantly changing since it is radial, because of this the m_0 inertial mass of the fermions constant.

The photon's 1 spin value and the electric charges $1/2$ spin gives us the idea, that the electric charge and the electromagnetic wave two sides of the same thing, $1/2 - (-1/2) = 1$.

Fine structure constant

The Planck constant was first described as the proportionality constant between the energy E of a photon and the frequency ν of its associated electromagnetic wave. This relation between the energy and frequency is called the Planck relation or the Planck–Einstein equation:

$$E = h\nu .$$

Since the frequency ν , wavelength λ , and speed of light c are related by $\lambda\nu = c$, the Planck relation can also be expressed as

$$E = \frac{hc}{\lambda}.$$

Since this is the source of the Planck constant, the e electric charge countable from the Fine structure constant. This also related to the Heisenberg uncertainty relation, saying that the mass of the proton should be bigger than the electron mass because of the difference between their wavelengths, since $E = mc^2$.

The expression of the fine-structure constant becomes the abbreviated

$$\alpha = \frac{e^2}{\hbar c}$$

This is a dimensionless constant expression, $1/137$ commonly appearing in physics literature.

This means that the electric charge is a result of the electromagnetic waves diffractions, consequently the proton – electron mass rate is the result of the equal intensity of the corresponding electromagnetic frequencies in the Planck distribution law.

Planck Distribution Law

The Planck distribution law explains the different frequencies of the proton and electron, giving equal intensity to different lambda wavelengths! The weak interaction transforms an electric charge in the diffraction pattern from one side to the other side, causing an electric dipole momentum change, which violates the CP and time reversal symmetry.

The Planck distribution law is temperature dependent and it should be true locally and globally. I think that Einstein's energy-matter equivalence means some kind of existence of electromagnetic oscillations enabled by the temperature, creating the different matter formulas, atoms, molecules, crystals, dark matter and energy.

One way dividing the proton to three parts is, dividing his oscillation by the three direction of the space. We can order $1/3 e$ charge to each coordinates and $2/3 e$ charge to one plane oscillation, because the charge is scalar. In this way the proton has two $+2/3 e$ plane oscillation and one linear oscillation with $-1/3 e$ charge. The colors of quarks are coming from the three directions of coordinates and the proton is colorless. [1]

Gravity from the point of view of quantum physics

The Gravitational force

The gravitational attractive force is basically a magnetic force.

The same electric charges can attract one another by the magnetic force if they are moving parallel in the same direction. Since the electrically neutral matter is composed of negative and positive charges they need 2 photons to mediate this attractive force, one per charges. The Bing

Bang caused parallel moving of the matter gives this magnetic force, experienced as gravitational force.

Since graviton is a tensor field, it has spin = 2, could be 2 photons with spin = 1 together.

You can think about photons as virtual electron – positron pairs, obtaining the necessary virtual mass for gravity.

The mass as seen before a result of the diffraction, for example the proton – electron mass ratio $M_p=1840 M_e$. In order to move one of these diffraction maximum (electron or proton) we need to intervene into the diffraction pattern with a force appropriate to the intensity of this diffraction maximum, means its intensity or mass.

The Big Bang caused acceleration created radial currents of the matter, and since the matter is composed of negative and positive charges, these currents are creating magnetic field and attracting forces between the parallel moving electric currents. This is the gravitational force experienced by the matter, and also the mass is result of the electromagnetic forces between the charged particles.

The positive and negative charged currents attracts each other or by the magnetic forces or by the much stronger electrostatic forces!?

The gravitational force attracting the matter, causing concentration of the matter in a small space and leaving much space with low matter concentration: dark matter and energy. There is an asymmetry between the mass of the electric charges, for example proton and electron, can understood by the asymmetrical Planck Distribution Law. This temperature dependent energy distribution is asymmetric around the maximum intensity, where the annihilation of matter and antimatter is a high probability event. The asymmetric sides are creating different frequencies of electromagnetic radiations being in the same intensity level and compensating each other. One of these compensating ratios is the electron – proton mass ratio. The lower energy side has no compensating intensity level, it is the dark energy and the corresponding matter is the dark matter.

The Graviton

In physics, the graviton is a hypothetical elementary particle that mediates the force of gravitation in the framework of quantum field theory. If it exists, the graviton is expected to be massless (because the gravitational force appears to have unlimited range) and must be a spin-2 boson. The spin follows from the fact that the source of gravitation is the stress-energy tensor, a second-rank tensor (compared to electromagnetism's spin-1 photon, the source of which is the four-current, a first-rank tensor). Additionally, it can be shown that any massless spin-2 field would give rise to a force indistinguishable from gravitation, because a massless spin-2 field must couple to (interact with) the stress-energy tensor in the same way that the gravitational field does. This result suggests that, if a massless spin-2 particle is discovered, it must be the

graviton, so that the only experimental verification needed for the graviton may simply be the discovery of a massless spin-2 particle. [2]

Conclusions

Needless to say that the accelerating electrons of the steady stationary current are a simple demystification of the magnetic field, by creating a decreasing charge distribution along the wire, maintaining the decreasing U potential and creating the \underline{A} vector potential experienced by the electrons moving by \underline{v} velocity relative to the wire. This way it is easier to understand also the time dependent changes of the electric current and the electromagnetic waves as the resulting fields moving by c velocity.

It could be possible something very important law of the nature behind the self maintaining \underline{E} accelerating force by the accelerated electrons. The accelerated electrons created electromagnetic fields are so natural that they occur as electromagnetic waves traveling with velocity c. It shows that the electric charges are the result of the electromagnetic waves diffraction.

One of the most important conclusions is that the electric charges are moving in an accelerated way and even if their velocity is constant, they have an intrinsic acceleration anyway, the so called spin, since they need at least an intrinsic acceleration to make possible their movement. The bridge between the classical and quantum theory is based on this intrinsic acceleration of the spin, explaining also the Heisenberg Uncertainty Principle. The particle – wave duality of the electric charges and the photon makes certain that they are both sides of the same thing. Basing the gravitational force on the accelerating Universe caused magnetic force and the Planck Distribution Law of the electromagnetic waves caused diffraction gives us the basis to build a Unified Theory of the physical interactions.

The electric currents causing self maintaining electric potential is the source of the special and general relativistic effects. The Higgs Field is the result of the electromagnetic induction. The Graviton is two photons together. [3]

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[4] Does the universe have a rest frame?

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[5] NASA tests atomic clock for deep space navigation

<https://phys.org/news/2018-02-nasa-atomic-clock-deep-space.html>