Evidence for dark matter in Milky Way

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Researchers may have uncovered a way to observe dark matter thanks to a discovery involving X-ray emissions. [13]

Between 2009 and 2013, the Planck satellite observed relic radiation, sometimes called cosmic microwave background (CMB) radiation. Today, with a full analysis of the data, the quality of the map is now such that the imprints left by dark matter and relic neutrinos are clearly visible. [12]

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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 Weak Interaction changes the temperature dependent Planck Distribution of the electromagnetic oscillations and changing the non-compensated dark matter rate, giving the responsibility to the sterile neutrino.
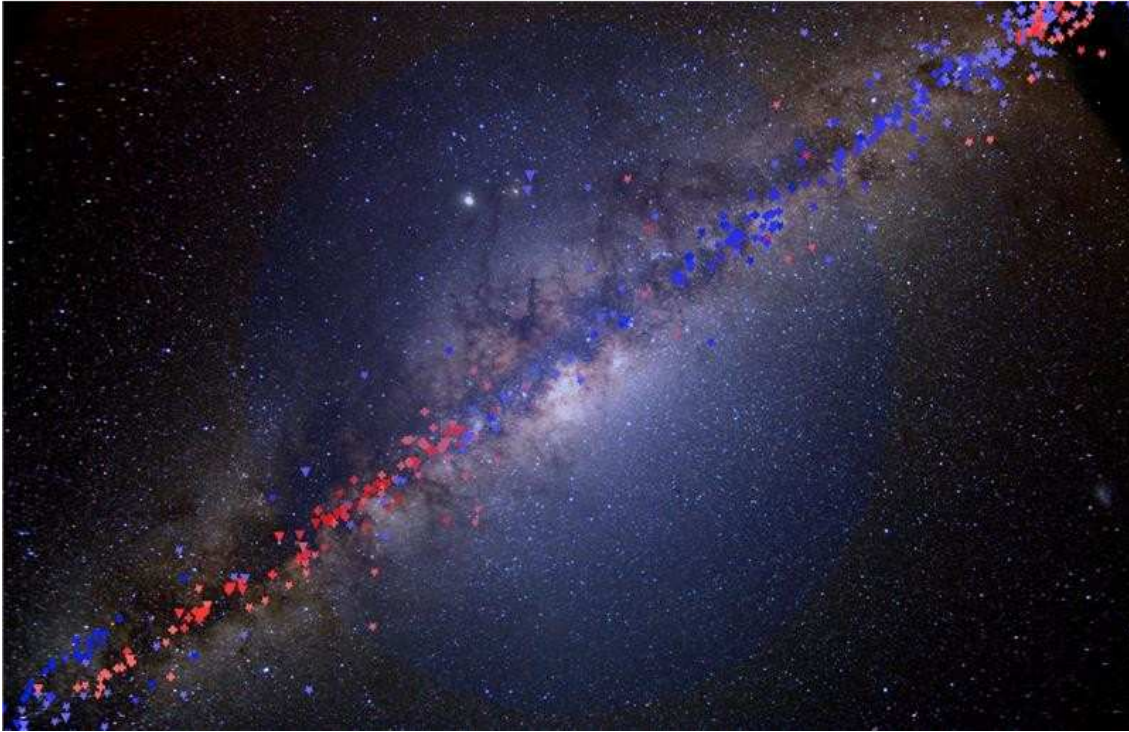
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Author: George Rajna

Evidence for dark matter in the inner Milky Way

The rotation curve tracers used in the paper over a photo of the disc of the Milky Way as seen from the Southern Hemisphere. The tracers are color-coded in blue or red according to their relative motion with respect to the Sun. The spherically symmetric blue halo illustrates the dark matter distribution.

The existence of dark matter in the outer parts of the Milky Way is well established. But historically it has proven very difficult to establish the presence of dark matter in the innermost regions, where the Solar System is located. This is due to the difficulty of measuring the rotation of gas and stars with the needed precision from our own position in the Milky Way.

"In our new study, we obtained for the first time a direct observational proof of the presence of dark matter in the innermost part of the Milky Way. We have created the most complete compilation so far of published measurements of the motion of gas and stars in the Milky Way, and compared the measured rotation speed with that expected under the assumption that only luminous matter exists in the Galaxy. The observed rotation cannot be explained unless large amounts of dark matter exist around us, and between us and the Galactic centre", says Miguel Pato at the Department of Physics, Stockholm University.

Dark matter is about five times more abundant than the matter that we are familiar with, made of atoms. Its existence in galaxies was robustly established in the 1970s with a variety of techniques, including the measurement of the rotation speed of gas and stars, which provides a way to effectively "weigh" the host galaxy and determine its total mass.

 "Our method will allow for upcoming astronomical observations to measure the distribution of dark matter in our Galaxy with unprecedented precision. This will permit to refine our understanding of

the structure and evolution of our Galaxy, and it will trigger more robust predictions for the many experiments worldwide that search for dark matter particles. The study therefore constitutes a fundamental step forward in the quest for the nature of dark matter", says Miguel Pato. [14]

Researchers may have uncovered a way to observe dark matter thanks to a discovery involving X-ray emissions.

Anyone with a passing knowledge of space and astronomy has heard of dark matter, a material believed to account for most of the known universe. We say "believed" because technically it hasn't been observed; the only reason we know it exists is because of gravitational effects on nearby objects, but otherwise it's completely invisible to light. But a major discovery this week suggests that invisibility doesn't extend to X-Ray emissions, which scientists may finally have used to detect dark matter in the universe.

It all happened when astronomers were reviewing data collected by the European Space Agency's XMM-Newton spacecraft and noticed a spike in X-Ray emissions. The anomaly came from two celestial objects - the Andromeda galaxy and Perseus galaxy cluster specifically - but didn't correspond to any known particle or atom. What the researchers did notice, however, was that it lined up perfectly with the theoretical behaviors of dark matter, allowing us to finally "see" it for the first time.

"With the goal of verifying our findings," said Alexey Boyarsky of Switzerland's École Polytechnique Fédérale de Lausanne, "we then looked at data from our own galaxy, the Milky Way, and made the same observations."

If the EPFL's findings hold up, this has huge implications for future astronomy research. Our current picture of space accounts for dark matter tangentially since we can't actually see it. But Boyarksy thinks it might be possible to develop technology to observe it directly, which could vastly change our perceptions of outer space.

"Confirmation of this discovery may lead to construction of new telescopes specially designed for studying the signals from dark matter particles," Boyarsky explain. "We will know where to look in order to trace dark structures in space and will be able to reconstruct how the universe has formed."

That also sounds handy if we ever get warp technology off the ground and need to chart a path around dark matter, but I'm probably getting ahead of myself on that score. [13]

New revelations on dark matter and relic neutrinos

The Planck collaboration, which notably includes the CNRS, CEA, CNES and several French universities, has disclosed, at a conference in Ferrara, Italy, the results of four years of observations from the ESA's Planck satellite. The satellite aims to study relic radiation (the most ancient light in the Universe). This light has been measured precisely across the entire sky for the first time, in both intensity and polarization, thereby producing the oldest image of the Universe. This primordial light lets us "see" some of the most elusive particles in the Universe: dark matter and relic neutrinos.

Between 2009 and 2013, the Planck satellite observed relic radiation, sometimes called cosmic microwave background (CMB) radiation. Today, with a full analysis of the data, the quality of the map is now such that the imprints left by dark matter and relic neutrinos are clearly visible.

Already in 2013, the map for variations in light intensity was released, showing where matter was in the sky 380,000 years after the Big Bang. Thanks to the measurement of the polarization of this light (in four of seven frequencies, for the moment), Planck can now see how this material used to move. Our vision of the primordial Universe has thus become dynamic. This new dimension, and the quality of the data, allows us to test numerous aspects of the standard model of cosmology. In particular, they illuminate the most elusive of particles: dark matter and neutrinos.

New constraints on dark matter

The Planck collaboration results now make it possible to rule out an entire class of models of dark matter, in which dark matter-antimatter annihilation is important. Annihilation is the process whereby a particle and its antiparticle jointly disappear, followed by a release in energy.

The basic existence of dark matter is becoming firmly established, but the nature of dark matter particles remains unknown. There are numerous hypotheses concerning the physical nature of this matter, and one of today's goals is to whittle down the possibilities, for instance by searching for the effects of this mysterious matter on ordinary matter and light. Observations made by Planck show that it is not necessary to appeal to the existence of strong dark matter-antimatter annihilation to explain the dynamics of the early universe. Such events would have produced enough energy to exert an influence on the evolution of the light-matter fluid in the early universe, especially around the time relic radiation was emitted. However, the most recent observations show no hints that this actually took place.

These new results are even more interesting when compared with measurements made by other instruments. The satellites Fermi and Pamela, as well as the AMS-02 experiment aboard the International Space Station, have all observed an excess of cosmic rays, which might be interpreted as a consequence of dark matter annihilation. Given the Planck observations, however, an alternative explanation for these AMS-02 or Fermi measurements—such as radiation from undetected pulsars—has to be considered, if one is to make the reasonable hypothesis that the properties of dark matter particles are stable over time.

Additionally, the Planck collaboration has confirmed that dark matter comprises a bit more than 26% of the Universe today (figure deriving from its 2013 analysis), and has made more accurate maps of the density of matter a few billion years after the Big Bang, thanks to measurements of temperature and B-mode polarization.

Neutrinos from the earliest instants detected

The new results from the Planck collaboration also inform us about another type of very elusive particle, the neutrino. These "ghost" particles, abundantly produced in our Sun for example, can pass through our planet with almost no interaction, which makes them very difficult to detect. It is therefore not realistic to directly detect the first neutrinos, which were created within the first second after the Big Bang, and which have very little energy. However, for the first time, Planck has unambiguously detected the effect these relic neutrinos have on relic radiation maps.

The relic neutrinos detected by Planck were released about one second after the Big Bang, when the Universe was still opaque to light but already transparent to these particles, which can freely escape from environments that are opaque to photons, such as the Sun's core. 380,000 years later, when relic radiation was released, it bore the imprint of neutrinos because photons had gravitational interaction with these particles. Observing the oldest photons thus made it possible to confirm the properties of neutrinos.

Planck observations are consistent with the standard model of particle physics. They essentially exclude the existence of a fourth species of neutrinos, previously considered a possibility based on the final data from the WMAP satellite, the US predecessor of Planck. Finally, Planck makes it possible to set an upper limit to the sum of the mass of neutrinos, currently established at 0.23 eV (electron-volt).

The full data set for the mission, along with associated articles that will be submitted to the journal Astronomy & Astrophysics (A&A), will be available December 22 on the ESA web site. [12]

The Big Bang

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.

Evidence for an accelerating universe

One of the observational foundations for the big bang model of cosmology was the observed expansion of the universe. [9] Measurement of the expansion rate is a critical part of the study, and it has been found that the expansion rate is very nearly "flat". That is, the universe is very close to the critical density, above which it would slow down and collapse inward toward a future "big crunch". One of the great challenges of astronomy and astrophysics is distance measurement over the vast distances of the universe. Since the 1990s it has become apparent that type Ia supernovae offer a unique opportunity for the consistent measurement of distance out to perhaps 1000 Mpc. Measurement at these great distances provided the first data to suggest that the expansion rate of the universe is actually accelerating. That acceleration implies an energy density that acts in opposition to gravity which would cause the expansion to accelerate. This is an energy density which we have not directly detected observationally and it has been given the name "dark energy".

The type Ia supernova evidence for an accelerated universe has been discussed by Perlmutter and the diagram below follows his illustration in Physics Today.
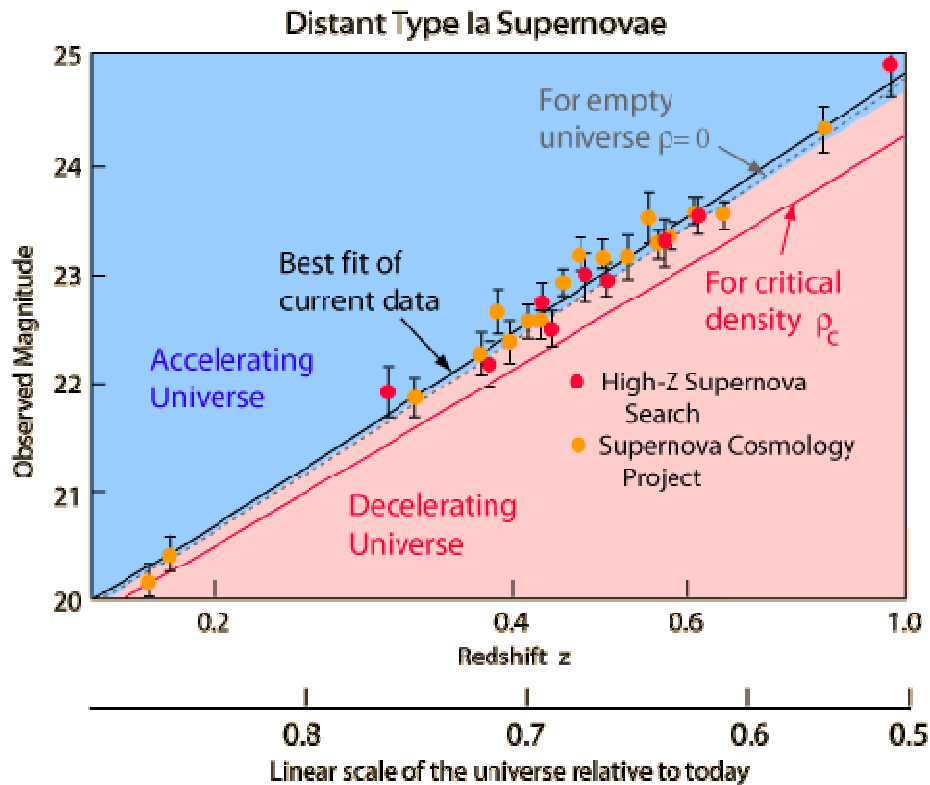
The data summarized in the illustration above involve the measurement of the redshifts of the distant supernovae. The observed magnitudes are plotted against the redshift parameter z. Note that there are a number of Type 1a supernovae around z=.6, which with a Hubble constant of 71 km/s/mpc is a distance of about 5 billion light years.

Equation

The cosmological constant Λ appears in Einstein's field equation [5] in the form of

$$R_{\mu\nu} - \frac{1}{2}R\,g_{\mu\nu} + \Lambda\,g_{\mu\nu} = \frac{8\pi G}{c^4}T_{\mu\nu},$$

where R and g describe the structure of spacetime, T pertains to matter and energy affecting that structure, and G and c are conversion factors that arise from using traditional units of measurement. When Λ is zero, this reduces to the original field equation of general relativity. When T is zero, the field equation describes empty space (the vacuum).

The cosmological constant has the same effect as an intrinsic energy density of the vacuum, ρ_{vac} (and an associated pressure). In this context it is commonly moved onto the right-hand side of the equation, and defined with a proportionality factor of 8π: Λ = $8\pi\rho_{vac}$, where unit conventions of general relativity are used (otherwise factors of G and c would also appear). It is common to quote values of energy density directly, though still using the name "cosmological constant".

A positive vacuum energy density resulting from a cosmological constant implies a negative pressure, and vice versa. If the energy density is positive, the associated negative pressure will drive an accelerated expansion of the universe, as observed. (See dark energy and cosmic inflation for details.)

Explanatory models

Models attempting to explain accelerating expansion include some form of dark energy, dark fluid or phantom energy. The most important property of dark energy is that it has negative pressure which is distributed relatively homogeneously in space. The simplest explanation for dark energy is that it is a cosmological constant or vacuum energy; this leads to the Lambda-CDM model, which is generally known as the Standard Model of Cosmology as of 2003-2013, since it is the simplest model in good agreement with a variety of recent observations.

Dark Matter and Energy

Dark matter is a type of matter hypothesized in astronomy and cosmology to account for a large part of the mass that appears to be missing from the universe. Dark matter cannot be seen directly with telescopes; evidently it neither emits nor absorbs light or other electromagnetic radiation at any significant level. It is otherwise hypothesized to simply be matter that is not reactant to light. Instead, the existence and properties of dark matter are inferred from its gravitational effects on visible matter, radiation, and the large-scale structure of the universe. According to the Planck mission team, and based on the standard model of cosmology, the total mass–energy of the known universe contains 4.9% ordinary matter, 26.8% dark matter and 68.3% dark energy. Thus, dark matter is estimated to constitute 84.5% of the total matter in the universe, while dark energy plus dark matter constitute 95.1% of the total content of the universe. [6]

Cosmic microwave background

The cosmic microwave background (CMB) is the thermal radiation assumed to be left over from the "Big Bang" of cosmology. When the universe cooled enough, protons and electrons combined to form neutral atoms. These atoms could no longer absorb the thermal radiation, and so the universe became transparent instead of being an opaque fog. [7]

Thermal radiation

Thermal radiation is electromagnetic radiation generated by the thermal motion of charged particles in matter. All matter with a temperature greater than absolute zero emits thermal radiation. When the temperature of the body is greater than absolute zero, interatomic collisions cause the kinetic energy of the atoms or molecules to change. This results in charge-acceleration and/or dipole oscillation which produces electromagnetic radiation, and the wide spectrum of radiation reflects the wide spectrum of energies and accelerations that occur even at a single temperature. [8]
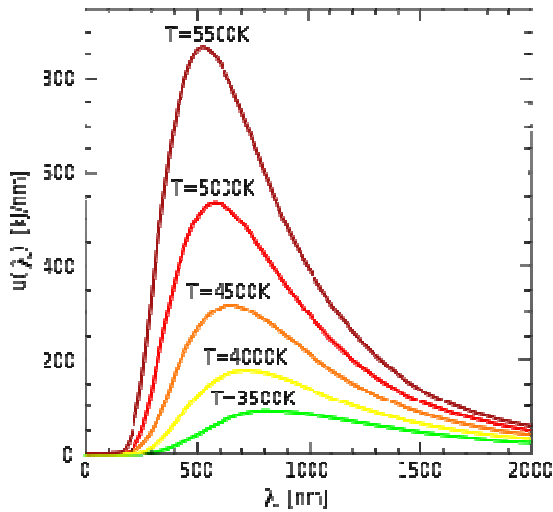
Electromagnetic Field and Quantum Theory

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 **A** vector potential experienced by the electrons moving by **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 **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 they 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. [4]

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.

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_o 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

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The frequency dependence of mass

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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.

The Weak Interaction

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.

Another important issue of the quark model is when one quark changes its flavor such that a linear oscillation transforms into plane oscillation or vice versa, changing the charge value with 1 or -1. This kind of change in the oscillation mode requires not only parity change, but also charge and time changes (CPT symmetry) resulting a right handed anti-neutrino or a left handed neutrino.

The right handed anti-neutrino and the left handed neutrino exist only because changing back the quark flavor could happen only in reverse order, because they are different geometrical

constructions, the u is 2 dimensional and positively charged and the d is 1 dimensional and negatively charged. It needs also a time reversal, because anti particle (anti neutrino) is involved.

The neutrino is a 1/2spin creator particle to make equal the spins of the weak interaction, for example neutron decay to 2 fermions, every particle is fermions with ½ spin. The weak interaction changes the entropy since more or less particles will give more or less freedom of movement. The entropy change is a result of temperature change and breaks the equality of oscillator diffraction intensity of the Maxwell–Boltzmann statistics. This way it changes the time coordinate measure and makes possible a different time dilation as of the special relativity.

The limit of the velocity of particles as the speed of light appropriate only for electrical charged particles, since the accelerated charges are self maintaining locally the accelerating electric force. The neutrinos are CP symmetry breaking particles compensated by time in the CPT symmetry, that is the time coordinate not works as in the electromagnetic interactions, consequently the speed of neutrinos is not limited by the speed of light.

The weak interaction T-asymmetry is in conjunction with the T-asymmetry of the second law of thermodynamics, meaning that locally lowering entropy (on extremely high temperature) causes the weak interaction, for example the Hydrogen fusion.

Probably because it is a spin creating movement changing linear oscillation to 2 dimensional oscillation by changing d to u quark and creating anti neutrino going back in time relative to the proton and electron created from the neutron, it seems that the anti neutrino fastest then the velocity of the photons created also in this weak interaction?

A quark flavor changing shows that it is a reflection changes movement and the CP- and T- symmetry breaking. This flavor changing oscillation could prove that it could be also on higher level such as atoms, molecules, probably big biological significant molecules and responsible on the aging of the life.

Important to mention that the weak interaction is always contains particles and antiparticles, where the neutrinos (antineutrinos) present the opposite side. It means by Feynman's interpretation that these particles present the backward time and probably because this they seem to move faster than the speed of light in the reference frame of the other side.

Finally since the weak interaction is an electric dipole change with ½ spin creating; it is limited by the velocity of the electromagnetic wave, so the neutrino's velocity cannot exceed the velocity of light.

The General Weak Interaction

The Weak Interactions T-asymmetry is in conjunction with the T-asymmetry of the Second Law of Thermodynamics, meaning that locally lowering entropy (on extremely high temperature) causes for example the Hydrogen fusion. The arrow of time by the Second Law of Thermodynamics shows the increasing entropy and decreasing information by the Weak Interaction, changing the temperature dependent diffraction patterns. A good example of this is the neutron decay, creating more particles with less known information about them.

The neutrino oscillation of the Weak Interaction shows that it is a general electric dipole change and it is possible to any other temperature dependent entropy and information changing diffraction pattern of atoms, molecules and even complicated biological living structures.

We can generalize the weak interaction on all of the decaying matter constructions, even on the biological too. This gives the limited lifetime for the biological constructions also by the arrow of time. There should be a new research space of the Quantum Information Science the 'general neutrino oscillation' for the greater then subatomic matter structures as an electric dipole change. There is also connection between statistical physics and evolutionary biology, since the arrow of time is working in the biological evolution also.

The Fluctuation Theorem says that there is a probability that entropy will flow in a direction opposite to that dictated by the Second Law of Thermodynamics. In this case the Information is growing that is the matter formulas are emerging from the chaos. So the Weak Interaction has two directions, samples for one direction is the Neutron decay, and Hydrogen fusion is the opposite direction.

The Sterile Neutrino

By definition the sterile neutrino does not participate in the electromagnetic and weak interactions, only the gravitational force gives its mass. There should be one strange neutrino that changes the diffraction patterns of the electromagnetic oscillations leaving the low frequencies side of the Planck Distribution Law with non-compensated high frequency side. Since the neutrino oscillation and the general weak interaction this sterile neutrino can be oscillate to another measurable neutrino.

The change of the temperature at the Big Bang was the main source for this asymmetry and the creation of the dark matter by the Baryogenesis.[10] Later on also the weak interaction can change the rate of the dark matter, but less influencing it, see the temperature changes of the dark side in the Planck Distribution Law.

The Weak Interaction basically an electric dipole change and transferring the electric charge from one side of the diffraction pattern to the other side. If there is no other side (dark matter), the neutrino oscillation helps to change the frequency of the electromagnetic oscillations, causing real diffraction patterns and leaving the non – compensated side of the Planck Distribution curve for the invisible Dark Matter.

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 rate Mp=1840 Me. 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 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

A new study is providing evidence for the presence of dark matter in the innermost part of the Milky Way, including in our own cosmic neighborhood and the Earth's location. The study demonstrates that large amounts of dark matter exist around us, and also between us and the Galactic centre. The result constitutes a fundamental step forward in the quest for the nature of dark matter. [14]

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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] The sterile neutrino [11] disappears in the neutrino oscillation.

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